AUTOMOTIVE INDUSTRIES

A CHILTON PUBLICATION

NOVEMBER 1, 1960

Features • • •

MAKING THE RAMBLER ALUMINUM BLOCK ENGINE

COMFORT CRITERIA FOR SEAT DESIGN

FORD'S EXPANDED LINE OF TRUCKS AND TRACTORS

NEW TRUCKS AND BUSES AT THE LONDON SHOW

Chrysler's Ultra-Sonic Weld Testing

Al Strohauer, a methods engineer with Chrysler in Detroit, demonstrates ultra-sonic weld scanner. Looking on, left to right, are C. F. Vandekerck, mgr. of manufacturing services, Stamping Division; and Dick Neiley and Brook Galloway, of Sperry Products, Inc.

PAGE 40

ENGINEERING
MANAGEMENT • • PRODUCTION
DESIGN

At Amana Refrigeration, Inc.

STANOIL

IMPROVES PRODUCTION
REDUCES MAINTENANCE

Smooths operation of 600 ton hydraulic press

Situation: The 600 ton Verson Press at Amana is a vital operating component in the manufacture of home freezers and refrigerators. Its proper performance is necessary to the efficiency of Amana's entire manufacturing operation. That's why erratic press operation, caused by foaming of the hydraulic oil, was a serious problem.

What was done? In seeking the solution to this problem, Amana consulted their Standard Oil lubrication specialist who recommended STANOIL for this service. STANOIL Industrial Oil is a top quality, first-line industrial lubricating and hydraulic oil. It will provide excellent service in many different applications. And when tested by Amana, STANOIL proved perfect for use.

What has happened? Since STANOIL was first put to work at Amana, it has performed for extended periods of time without foaming or oxidation, lengthening the time between drainings and improving press operation. As a result of this record, STANOIL has been adopted for use on other production equipment, together with Standard's RYKON Greases and SUPERLA Soluble Oil.

What you can do: To get help in solving your lubrication problems and to learn more about STANOIL Industrial Oils, simply call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.**

You expect more from STANDARD and you get it!

Standard's Jess Nelson (center) and Gene Maske (left) checking lubrication survey with Leonard Rettig, Amana's plant maintenance superintendent. Jess, who is District Engineer for Standard, is a specialist in this kind of operation. He has an engineering degree from the University of Iowa, and has also graduated from the Standard Oil Sales Engineering School.

Quality metal products deserve
"the finishing touch" of Mahon

another
example . . .
fine office furniture from General Fireproofing

below: one of GF's new 1000 Series desks, part of a striking, new functionally designed business furniture line. At right: a stage of the complete finishing system designed and built by Mahon for GF's San Luis Obispo, Calif. plant.

Production finishing is the application of coatings of a specified quality at highest efficiency .That also sums up the business of Mahon's Industrial Equipment Division and they have learned it well . . . for over forty years . . . in hundreds of installations . . . for all types of finishing. Mahon metal-cleaning and metal-finishing systems will prove your best investment regardless of initial cost. In this highly specialized, multi-process area, can you afford less than the best for your quality products? Find out how Mahon's 'finishing touch' can improve your products . . . your costs . . . your sales. Call in Mahon.

MAHON INDUSTRIAL EQUIPMENT

- Finishing Systems
- Metal Cleaning Equipment
- Painting Facilities—spray, dip and flo-coaters
- Drying and Processing Ovens
- Special Plant and Production Equipment

WRITE FOR MAHON CATALOG A-660
ALSO IN SWEET'S P. E. FILE

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
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← Circle 101 on Inquiry Card for more data

Circle 104 on Inquiry Card for more data

Double-Layer Nickel Plating is the difference between this and this

Both of these plated panels were exposed in a corrosive marine atmosphere for 18 months!

You can see how the panel on the left — plated with a Nickel-Chromium coating that is perfectly suitable for less rugged use — fared in this severe outdoor test.

But the panel on the right — *coated to the same 2.0 mil thickness* — retained its rich original luster!

Why? *Double-Layer* Nickel Plating — a good thick layer of sulfur-free, semi-bright Nickel beneath the lustrous bright Nickel layer and the thin chromium overlay.

Remarkably durable, this combination provides outstanding resistance to corrosion, abrasion and wear . . . helps assure the mirror-bright, *lasting* eye appeal that satisfies today's quality-conscious customers.

For more information on the durability of decorative Nickel-Chromium plating, write for your free copy of *"The Contribution of Nickel and of Chromium to the Durability of Decorative Plating."*

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67 Wall Street INCO **New York 5, N. Y.**

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AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

NOVEMBER 1, 1960

Passenger Cars • Trucks • Buses • Aircraft • Tractors • Engines • Bodies • Trailers • Road Machinery • Farm Machinery • Parts and Components • Accessories • Production and Processing Equipment • Design • Production • Engineering • Management

VOL. 123 No. 9

Features • • •

▼ **Making Aluminum Cylinder Blocks**
The 1961 Rambler Classic Six engine, with a die-cast aluminum cylinder block, is the first of its kind to be produced in the USA. Page 33

▼ **The New Cars for 1961**
Offerings of the automobile makers for '61 reveal still more emphasis on compacts and models that fit between compacts and the regular lines. Page 37

▼ **Latest Vehicles at Brno Fair**
Automobile exhibits at the Brno International Fair indicate that Czechslovakia is increasing the range of its vehicles and tractors. Page 39

▼ **Increased Use of Welding at Chrysler Corporation Plants**
With the change to unit body construction, welding assumed an expanded role at Chrysler Corp. Control over the welding setup is in the hands of the Metals Joining Laboratory. Page 40

▼ **Farnborough Air Show**
Major consolidation of the British aircraft industry and disclosures of future projects were features of the Show. Page 42

▼ **Comfort Criteria for Seat Design**
Designer Henry Dreyfuss conducted an extensive research program, lasting five years in designing a mobile armchair for the Lockheed JetStar. Page 44

▼ **American Motors Corporation's New Line for 1961**
The Rambler American cars represent the first basic styling change in 11 years. Rambler Six and V-8 models feature refinements and improvements. Page 49

▼ **Ford Expands Truck Line to 619 Models**
In 1961 Ford will have twice as many truck models as were offered four years ago. There are 46 series in the new line. Page 50

▼ **Ford Introduces New Line of Tractors**
With the introduction of the H Series high-tilt-cab Diesel-powered tractors, the line now includes eight series and 108 models. Page 51

▼ **London Transport Show**
The United Kingdom increased production of commercial vehicles to an all-time high this year. A number of the developments are described and illustrated. Page 52

▼ **Machine Tool Activity Has Increased**
Reports to AI from machine tool builders indicate there is more inquiry activity, with more business in sight. Page 56

▼ **17 New Product Items and Other Features Such as:**
Machinery News, Metals, Airbriefs, and Automation News Report

. . . continued on next page

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MEMBER

SBME Society of Business Magazine Editors

NBP National Business Publications, Inc.

BPA Business Publications Audit of Circulation

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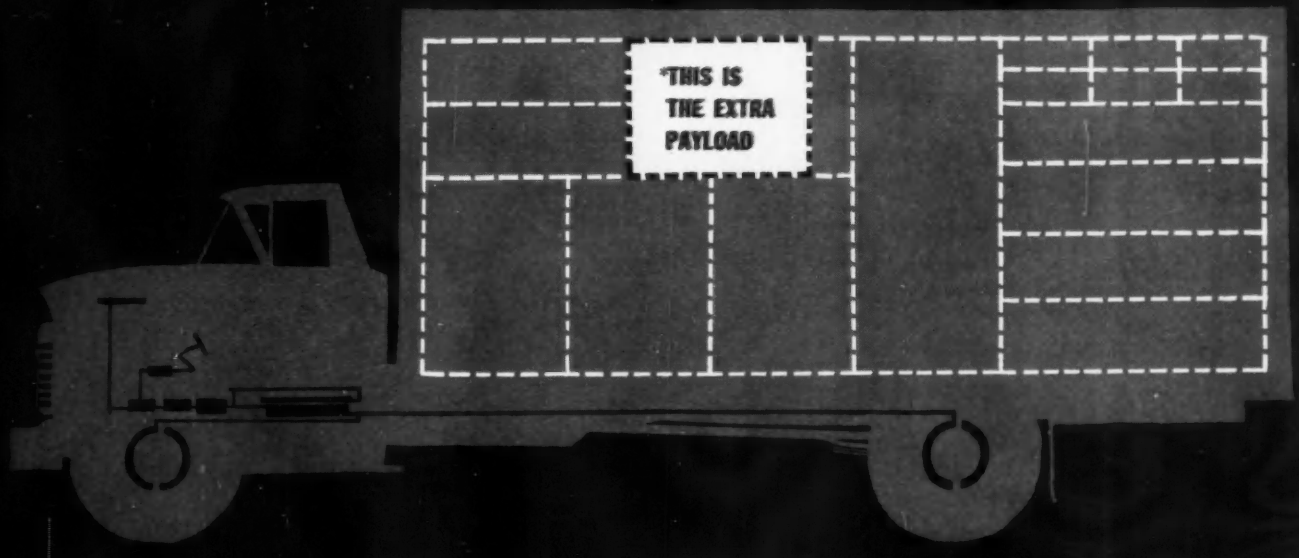
pyramid profits with extra payload*



PAYLOAD—Hydrovac Power Brakes weigh less, permit increased payloads up to several hundred pounds.

PRICE—Hydrovac Power Brakes cost *less to buy, less to operate, less to maintain.*

PROTECTION—*Built-in standby safety . . . manual braking available in case of power failure.*

More Bendix Hydrovac vacuum power brakes are in use than all other makes.

Bendix PRODUCTS DIVISION South Bend, IND.

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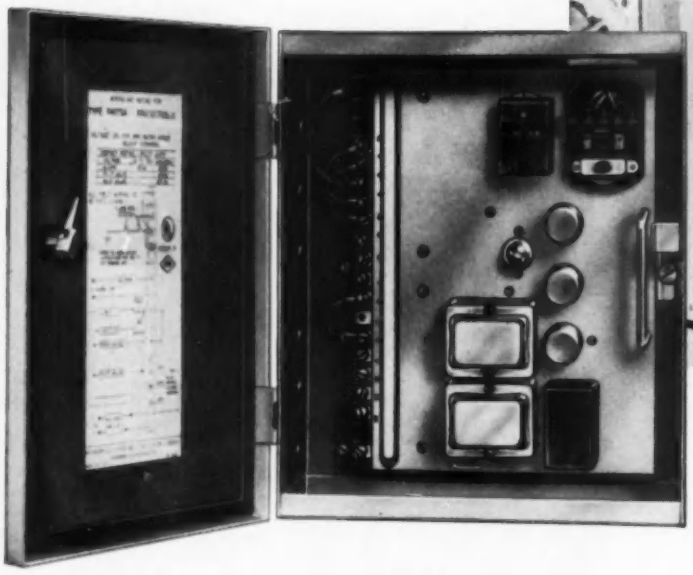
Honeywell is first with the only fail-safe flame safeguard!

New maximum-safety, self-checking relay prevents losses due to burner safeguard failure and resulting explosions.



The Honeywell Protectoglo* Relay offers you the most fail-safe protection yet devised for industrial burner safeguards—truly an important break-through in the art of flame safeguarding! Never before has a flame safeguard offered you such low-cost assurance against explosions and downtime. Compared to the Honeywell R4075, all other continuous process flame safeguards are obsolete!

In other flame safeguards, safe-start, self-checking networks operate *only during start up or recycling*. The new R4075 unit operates constantly. It will cause an immediate safety shutdown and sound an alarm if the sensing signal, amplifier or related circuitry fails *at any time* while the burners are operating or during start ups or shutdowns. This same self-checking circuit checks all components of the Protectoglo system including the flame rod once *every* second. You get maximum protection, not only on safeguard systems for constantly burning gas burners using flame rods, but also on gas- or oil-fired systems using Ultra-Vision flame detectors. For information on how the Honeywell R4075 can help your industry, call your nearest Honeywell office; or write: Minneapolis-Honeywell, Dept. AI-11-30, Minneapolis 8, Minnesota.

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Honeywell

75th YEAR PIONEERING THE FUTURE

First in Control SINCE 1885

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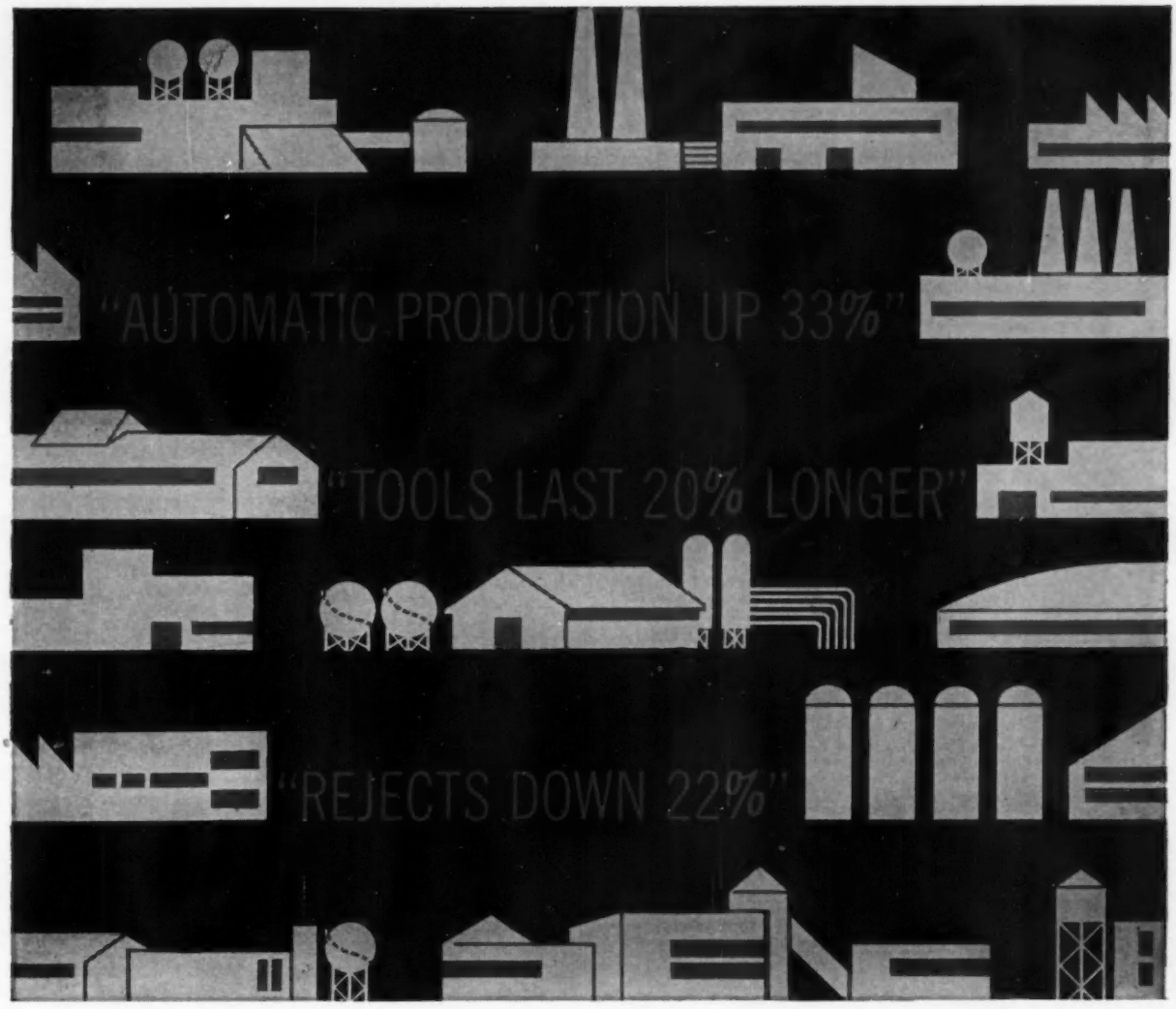

Why in the past 12 months hundreds of PLANTS HAVE SWITCHED TO CLEARTEX!

These automatic screw machine users have found that tri-purpose Cleartex has ended the problem of cutting oil dilution.

Manufacturers have found that in 7 out of 10 automatics, lube oil leaks into the cutting oil sump in spite of the most careful lubricating techniques. This diluted cutting oil can cause shortened tool life and piled-up rejects.

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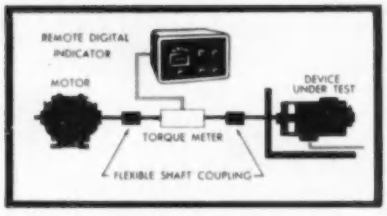

Torque readings are simplified with a strain gage torque pickup and PM's Indicator. Note how shaft torque is measured directly with no inertial losses as may be encountered in dynamometer trunnion bearings. Torque pickups may be installed in several points of a drive train to measure progressive losses.

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CALENDAR

OF COMING SHOWS AND MEETINGS

Material Handling Institute Show, Louisville, Ky. .....Nov. 1-3

SAE National Fuels and Lubricants Meeting, Tulsa, Okla.....Nov. 2-4

National Machine Tool Builders' Assn., 59th Annual Meeting, Hot Springs, Va.....Nov. 2-4

American Foundrymen's Society, Mich. Regional Conference, Saginaw, Mich. .....Nov. 3-4

American Institute of Industrial Engineers, Annual Regional Conference and Convention, Boston .....Nov. 3-4

The Society of Die Casting Engineers, Die Casting Exposition and Congress, Detroit.....Nov. 8-11

ASTME, Western Tool Show, Los Angeles .....Nov. 14-19

ASME, Winter Annual Meeting, New York .....Nov. 26-Dec. 1

National Exposition of Power and Mechanical Engineering, New York .....Nov. 28-Dec. 2

Semi-Annual Meeting, Malleable Founders Society, Cleveland...Dec. 2

Automotive Electric Association, 43rd Annual Meeting and 24th Annual Mfg.-Dist. Conference, Chicago .....Dec. 2-9

1960 Fleet Maintenance Exposition, New York City .....Dec. 5-8

Industrial Building Exposition and Congress, New York.....Dec. 12-15

1961

SAE, International Congress and Exposition .....Jan. 9-13

ISA, Winter Instrument-Automation Conference & Exhibit, St. Louis .....Jan. 16-19

1961 Plant Maintenance & Engineering Conference, Chicago Jan. 23-26

29th Annual Meeting, Institute of the Aeronautical Science, New York .....Jan. 23-25

12th Annual Plant Maintenance & Engineering Show, Chicago Jan. 23-26

American Foundrymen's Society, Wisconsin Regional Conference, Milwaukee .....Feb. 9-10

ASME, Gas Turbine Power Div., Co-Sponsored by The Dept. of Defense, 6th Annual Gas Turbine Conference & Show, Washington, D. C.....Mar. 5-9

ASM, Western Metal Exposition, Los Angeles .....Mar. 20-24

Spring Technical Meeting, Pressed Metal Institute, New York Mar. 22-24

ASTME, 1961 Engineering Conference & Exhibit, New York..May 22-26

International Institute for Welding Meeting .....Apr. 10-15

American Welding Society, 42nd Annual Convention and Welding Exposition, New York.....Apr. 10-21

65th American Foundrymen's Society Exposition, San Francisco May 8-12

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946, AND JUNE 11, 1960 (74 STAT. 208), SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the Act of June 11, 1960, to be included in all statements regardless of frequency of issue.) 17,776.

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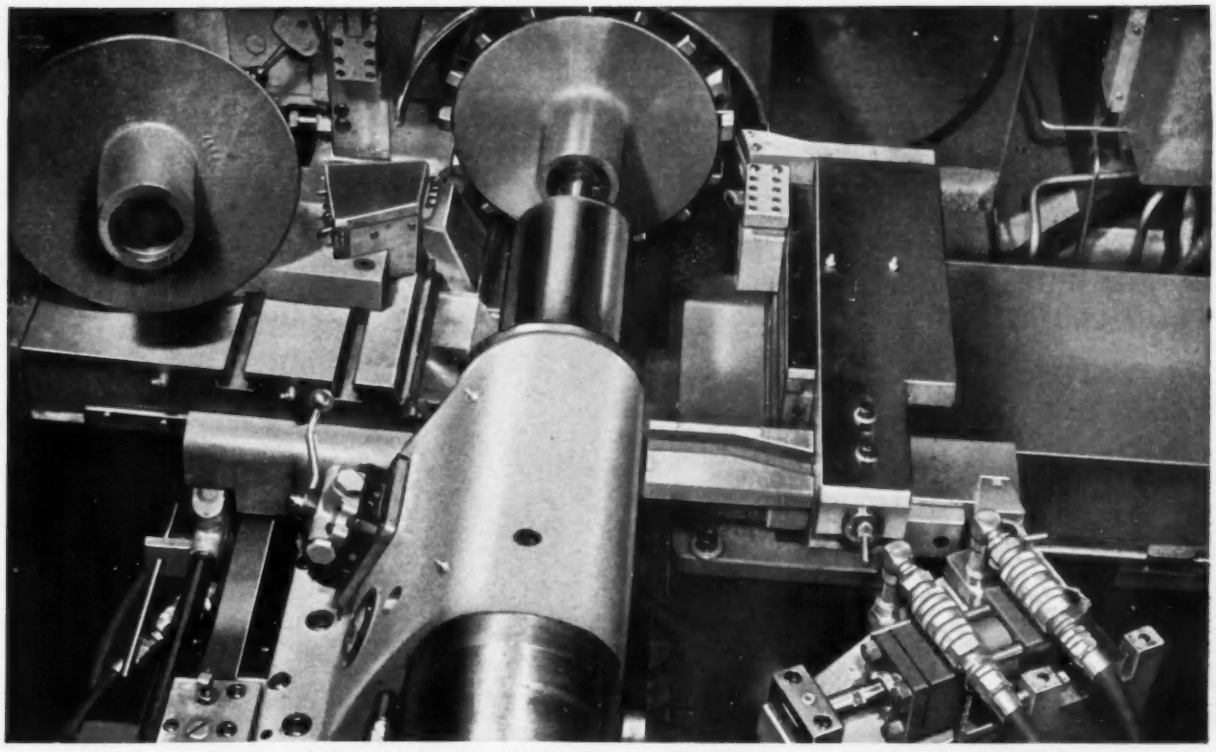
Sworn to and subscribed before me this 20th day of September, 1960.

JAMES MIADES

(Notary Public, Philadelphia, Philadelphia Co. My commission expires June 11, 1962.)

[Seal]



Note how 16-jaw chuck grips 10"-diameter, inner pulley disc on narrow portion of O.D. This permits machining entire flange face. Accurate taper is generated by cam-operated sliding toolholder shown at right.

No. 12 replaces two manual lathes, cuts time 53%

Automatic cycle, fast setup cut job-lot costs...free operator for other work.

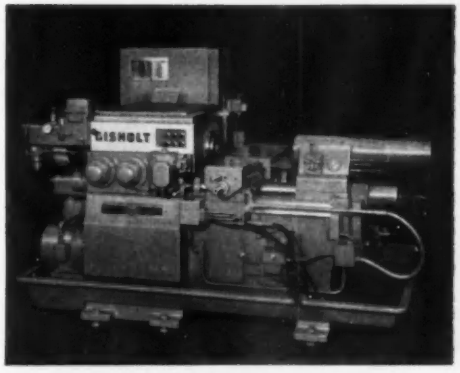
This fast, versatile setup may give you some new ideas on paring job-lot costs. Lewellen Manufacturing Company, Columbus, Indiana, uses it for machining three types of cast iron pulley discs in 15 sizes—in lots ranging from 50 to 100 pieces.

Previously this work required two manually operated lathes. Now one operator does the entire job 53% faster on one Gisholt No. 12 MASTERLINE Automatic Chucking Lathe.

Here's how a typical inner pulley disc, 10" in diameter, is handled: To permit machining beyond the tapered face, the work is held on a narrow portion of the previously turned O.D. in a 16-jaw chuck. A chuck-mounted mandrel with tailstock support provides rigidity for higher speeds and feeds.

Front carriage tools turn the hub O.D. within .0005" and form the base radius. The flange is taper-faced from a cam-controlled sliding toolholder on the rear independent slide. A second tool faces the hub end. Time, just 2.2 minutes, f.t.f.

Change-over for different sizes averages less than 30 minutes. One 30° adjustable cam handles all tapers. Quick-disconnect fittings are easily reversed for tool relief when changing from inner to outer discs.



Gisholt MASTERLINE No. 12 Automatic Chucking Lathe

FOR COMPLETE INFORMATION

on how the No. 12 can cut your costs on job-lots and production runs, contact your Gisholt Representative—or write for new catalog, Form 1213.

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Madison 10, Wisconsin

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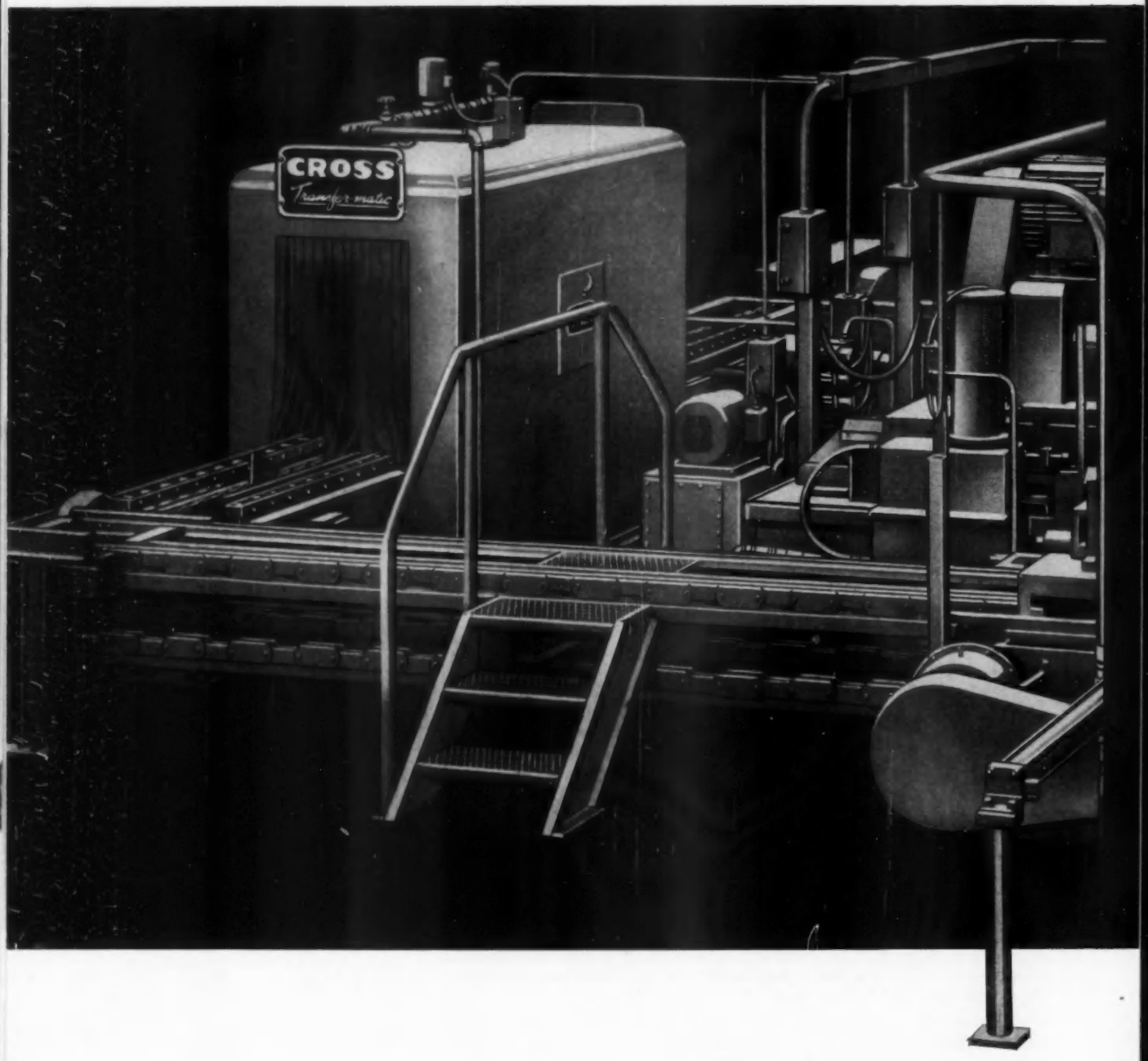
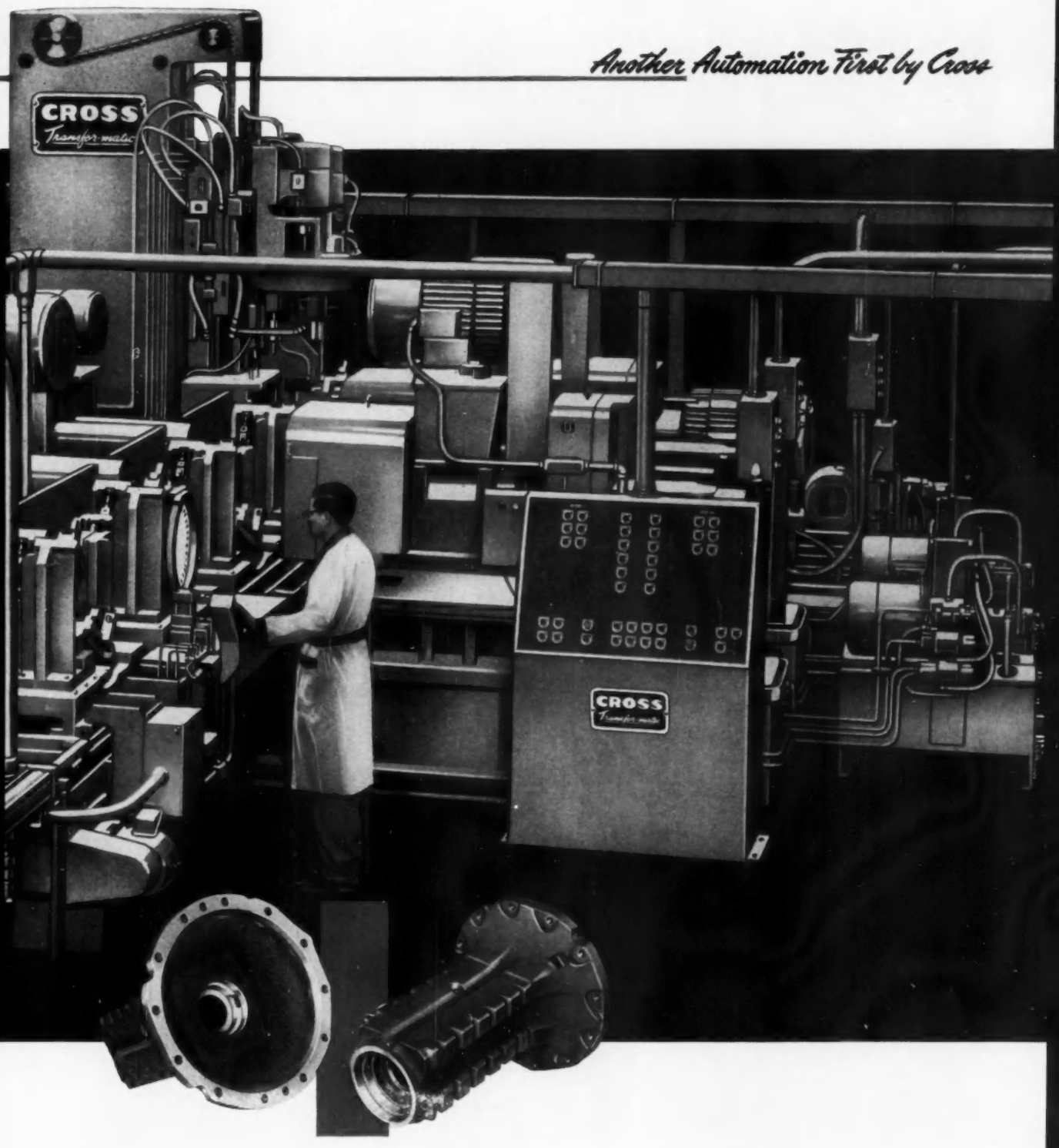


Assures Concentricity and Squareness of Bearing Seats, Counter-Bore and Mounting Flange

A significant breakthrough in processing of tractor rear axle housings has been accomplished by this new Transfer-matic which performs all machining operations.

An outstanding advantage of the machine is greater accuracy. Concentricity and squareness of the bearing seats, counter-bore and mounting flange are assured. Bore tolerances are ±0.0005. The concentricity, squareness, and center-distance tolerances between the bearing seats, faces and dowels is ±0.001. Close alignment between the two ends is maintained by doing all precision boring and the facing on both ends in one station.

Another Automation First by Cross



Four different housings weighing up to 175 pounds are processed with minor adjustments. Production requirements are up to 28 per hour for any of the four parts.

An unusual feature of the Transfer-matic is the use of two shuttle heads that index so that successive operations can be performed without moving the part. This design reduces the amount of capital investment required.

A Cross Sales Engineer will be glad to elaborate on these and other Cross developments.

Established 1898

THE CROSS CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

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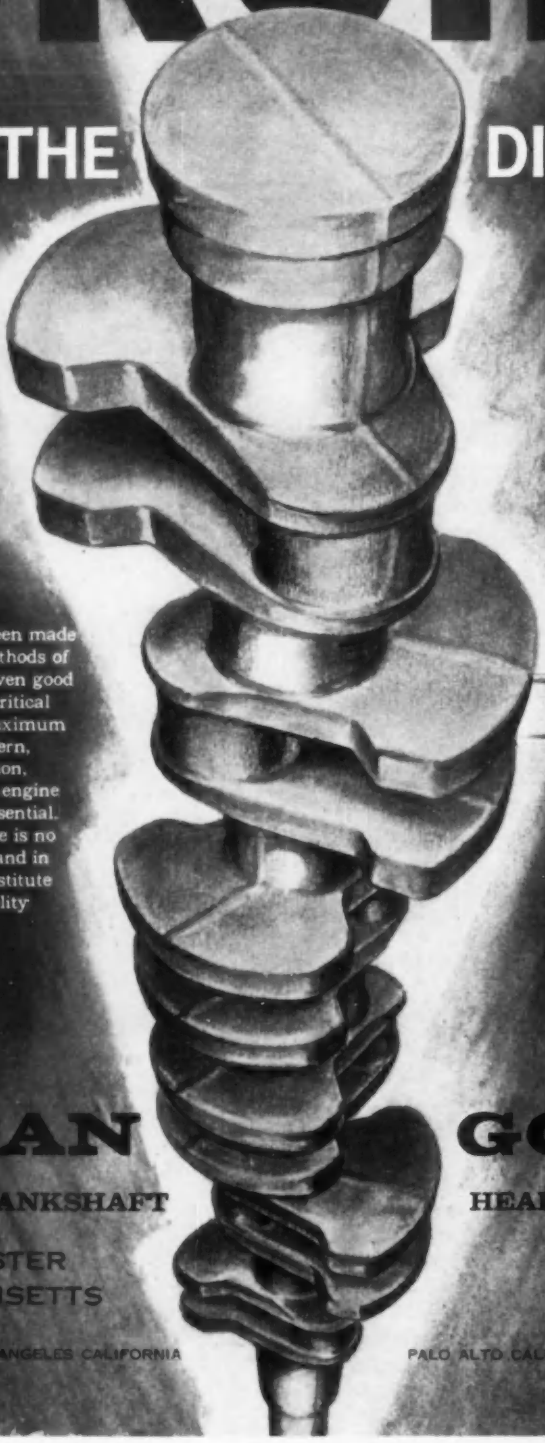
FORGING

MAKES THE DIFFERENCE



Crankshafts have been made successfully by other methods of fabrication and have proven good enough for certain non-critical applications — but for maximum dependability of the modern, compact, high-compression, high-torque, heavy-duty engine a forged crankshaft is essential.

In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

FORGED

WYMAN GORDON

CRANKSHAFT HEADQUARTERS

WORCESTER MASSACHUSETTS

HARVEY ILLINOIS

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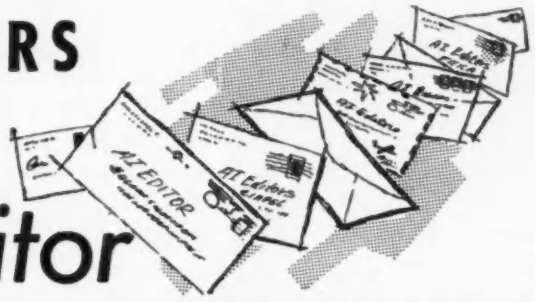
LETTERS to the Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

SOVIET AMPHIBS

I have just finished reading your fine article titled "Soviet Amphibious Vehicles" by James D. McGuire, which appears in your Sept. 15 edition of AUTOMOTIVE INDUSTRIES.

Would like to congratulate you and the author on this most interesting and informative presentation on current Russian amphibians.

This article has been of particular interest to our Engineers at Ingersoll Kalamazoo Division of Borg-Warner, since our division has been active in the design, development and production of military amphibians since 1941.

If available, we would like to have eight reprints of the above article for our library and engineering reference.

R. R. Brezinski
Test & Development Manager
Ingersoll Kalamazoo Div.
Borg-Warner Corp.
Kalamazoo, Mich.

QUALITY CONTROL

I find the booklet on Reliability and Quality Control of interest, and there are several articles I note that I would wish to read carefully. After that I will forward the booklet to the head of our Manufacturing Department.

The A. C. Spark Plug Reliability Program rather overwhelms me. Perhaps A. C. cover a broad range of products, other than Spark Plugs.

Seldon T. Williams
President
Scovill Manufacturing Co.
Waterbury, Conn.

● *You are correct. A. C. Spark Plug Division does cover a broad range of products, including many for national defense. A much more extensive study of A. C. Spark Plug will be published in a future issue.—Ed.*

I have noted with interest your report on reliability and quality control, and have passed this booklet on to the other interested members in our organization. I think you should be complimented for your excellent presentation.

W. G. Sutter
Purchasing Agent
The Budd Company
Philadelphia, Pa.

I certainly appreciated receiving the review copy of your technical publication in the field of reliability and quality control.

It is certainly an excellent job and we surely appreciate the inclusion of the ASQ Automotive Division in this book.

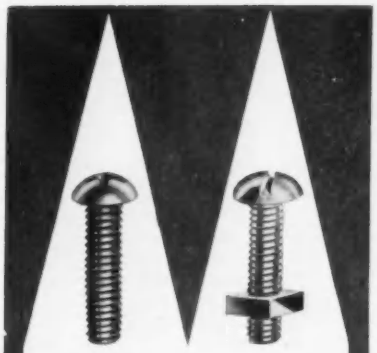
I am enclosing the names and addresses of the officers and directors of the Society, and we would certainly appreciate your sending copies directly to them.

William P. Youngclaus, Jr.
Administrative Secretary
American Society for Quality Control
Milwaukee, Wis.

AUTOMATION

I recently read with great interest your "Automation News Report" in the Aug. 1 issue of AUTOMOTIVE INDUSTRIES. I was pleased to see your treatment of our RW-300 installation at the B. F. Goodrich Chemical plant in Calvert City, Ky.

Kenneth J. Hayes
Thompson-Ramo-Wooldridge
Beverly Hills, Calif.



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DOW

Proving ground for

AUTOMOTIVE CHEMICALS

At Dow, where the test tube often serves as test track for automotive chemicals, there is a dedicated group of men who are exceedingly car conscious. These men of Dow's Automotive Chemicals Laboratories—car buffs in their own right—work together enthusiastically with automotive company engineers on a wide range of developmental applications, both current and future. The results of this natural cooperation may take the form of a better brake fluid, a safer metal cleaner, or a synthetic lubricant . . . one with properties for "years ahead" applications such as the new polyphenyl ethers . . .

NEW LUBRICANTS SHRUG OFF OXIDATION, RADIATION AT HIGH TEMPERATURES

Polyphenyl ethers exhibit marked improvements in lubricating properties and the ability to "take it" under adverse conditions. They're the result of a long range research program on synthetic lubricants at Dow . . . one of primary interest to forward-thinking automotive engineers.

Continuous research on synthetic lubricants in Dow's Automotive Chemicals Laboratories has spotlighted the polyphenyl ethers. These chemical materials have exceptional lubricating properties and excellent stability in the presence of oxidation, radiation and high heat.

THEIR LUBRICITY is comparable to the diester lubricants; in the Shell 4-Ball Wear Test, for example, the scar diameter is 0.9 mm. when operating at 600 rpm and 400°F for one hour at a loading of 50 kg. Polyphenyl ethers are resistant to radiation—changes in viscosity are minor after absorption of 1×10^{11} ergs per gram. In a non-oxidizing atmosphere, some polyphenyl ethers withstand 800°F for about 100 hours. In an oxidizing environment polyphenyl ethers can be used for long periods of time at temperatures up to 600°F. Low temperature use is currently limited to 30°F.

Dow is currently working with industry to perfect practical applications. The high resistance to radiation of polyphenyl ethers suggests their use in nuclear-powered aircraft and surface vehicles.

Synthetic lubricants pass lubricity exam for power steering pumps.

THIS RESEARCH AND DEVELOPMENTAL WORK is part of an over-all program on synthetic lubricants of all types, including the large and versatile polyglycol family. The polyglycols are characterized by many desirable lubricating properties. They have a high natural viscosity index, are non-carbonizing, and display improved oxidation and shear stability, sludge and varnish resistance. Polyglycol lubricants are used today in such diverse applications as crankcases, gas turbine engines, and hydraulic fluids.

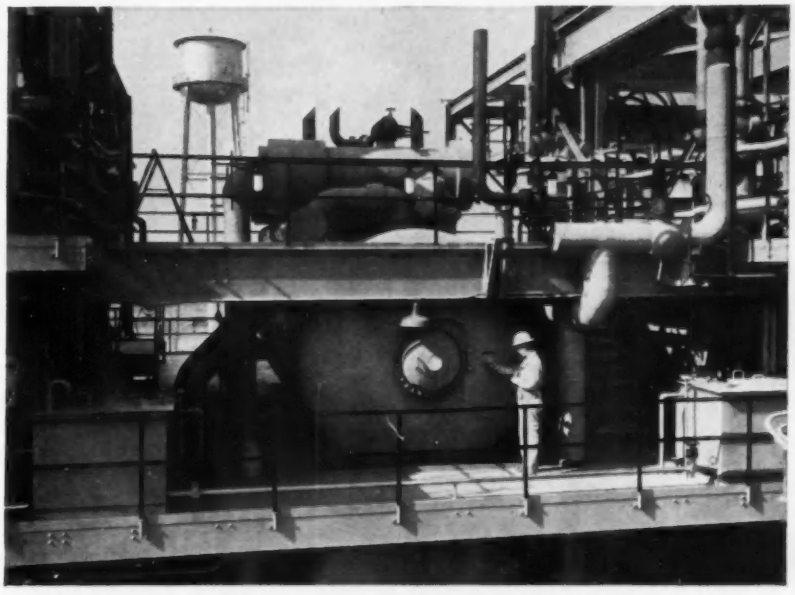
V.I. IMPROVER RESEARCH SHIFTS INTO HIGH. Although viscosity index improvers are relative newcomers, they're doing a man-sized job in many lubricating oils. Continuous research on them is being carried out at Dow—in fact, it's currently being speeded up in Dow's Automotive Chemicals Laboratories. Why? Because the tasks V.I. improvers are asked to perform have rapidly multiplied. Present "extra-curricular" jobs as pour point depressants and detergents are varied and complex; yet vastly improved properties will be expected of the V.I. improvers of a few years from now.

As an example of the specialized, modern research equipment utilized in this work, Dow has developed an apparatus that simulates 20,000 miles of road testing in just one hour's time! Similar testing devices are now being perfected in the lab.

RESEARCH PAYS OFF IN THE BOILER ROOM. Newcomers to the industrial scene, Dow research on chelating agents led to their application as boiler scale removal agents. These special chemical "claws" grab and hold metal ions in solution, rendering them inactive. Versene®, one of Dow's three chelating agents, speeds descaling many times over older standard methods. Other high-quality, low-cost members of the Dow family of chelating agents are Versenol® and Versenex*. *TRADEMARK

LOW-COST COST SAVER. As low-cost preservatives for soluble cutting oils, the Dowicide® products have made their mark as industrial cost savers. Dowicide preservatives are used to control bacteria and fungi. In the automotive industry, they result in substantial cost savings by preventing bacterial growth, odor, slime, and emulsion breakdown. They also cut costs on paper, coatings, packaging materials supplied to the automotive industry by preventing the growth of mold. Excellent, well-located production facilities assure fast, dependable supply.

Shear-testing V.I. improvers under "road test" conditions.



Dow chelating agents remove scale, restore boiler efficiency.

Dowicide preservatives control bacteria and fungi in cutting oils.

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THE DOW CHEMICAL COMPANY
Midland, Michigan

DOW

Photo courtesy The Maytag Company

Aristoloy Leaded 8620 cuts tool changes 50% on wringer drive sleeve for Maytag

Has working time been reduced? Yes.

In what way? The use of Aristoloy Leaded* has increased tool life and reduced downtime for tool changes.

Has machining been improved? Yes.

What inherent quality in the steel is responsible for improved machining? A more uniform, satisfactory microstructure provides better machining characteristics.

What operation is performed? Automatic screw machines bore, counterbore and cut off. Secondary operations include milling, drilling, internal and external grinding after carburizing.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city—or write for NEW PRODUCTS & FACILITIES CATALOG.

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Circle 114 on Inquiry Card for more data

NEWS

Vol. 123, No. 9 | Nov. 1, 1960

1.4 Million at Auto Show

Repeat Exhibit in '61 Appears Certain

By Hugh C. Quinn, Detroit Regional Editor, and C. B. Campbell, News Editor

Any way you look at it, the 43rd National Automobile Show was a whale of a success. The Automobile Manufacturers Association, sponsor of the show, will have a real challenge trying to top it next year.

And a repeat of the show seems certain — the record-breaking crowd of 1,403,873 makes a repeat performance a certainty. The AMA board of directors will make a final decision at the Nov. 20 board meeting.

Broke All Records

The nine-day show, which closed Oct. 23, drew more persons than any other auto show ever held. It topped the 800,000 attendance at the recent Paris Auto Show and even exceeded the Frankfort Auto Show, which drew more than Paris. And the Detroit show dwarfed the 42nd National Automobile Show, which counted some 320,000 in 1956 at the New York Coliseum.

Show officials had hoped for 500,000. Mayor Louis Miriani boasted the exhibit would pull a million persons into Detroit's new $54 million Cobo Hall, which was dedicated the day before the auto show preview. But no one dreamed the attendance figure would approach a million and a half. Just how many came to see Cobo Hall will never be known, but they all saw the auto show.

There were a goodly number of Annie Oaklies issued. The Oct. 14 preview, with more than 83,000 guests, was entirely invitational. And throughout the week, countless more passes were used.

But show officials (and, more important, member companies) say it's the total head count that matters in the long run. AMA did not expect to make money on the show—it was budgeted for a deficit to be underwritten by the member

Frederic G. Donner, President Eisenhower and L. L. Colbert

car and truck builders.

The AMA hoped to make the show a display case for new products of the industry. In this the manufacturers succeeded. Extensive publicity and news coverage made the record 1.4 million attendance almost secondary.

Eisenhower Speaks

In addition to the hour-long telecast that visited every automobile exhibit, plus the institutional "Auto Wonderland," the show got a second coast-to-coast TV coverage with President Eisenhower's address at the industry banquet. The dinner brought together more than 2200 executives and business leaders.

The automobile companies spent heavily on their elaborate exhibits, but before the winter is over, they will get their money's worth. From Detroit, the cutaway engines and chassis will travel the country for dealer shows. The result should be better dealer shows, with more attractive displays.

2 Manufacturing Units Combined by Ford

Ford Motor Co. has set up a new manufacturing engineering and development office as a component of the manufacturing staff. The new unit combines the former manufacturing engineering office and the manufacturing research office.

Peter H. Ponta, formerly head of the manufacturing engineering office, is director of the new unit. He will be responsible for the activities of the machining process, materials and equipment engineering, design and standards, material forming and assembly, industrial engineering and material handling engineering departments. He also will direct the activities of electrostatic paint and equipment development, welding development, manufacturing improvement and process development.

William W. Aulepp is assistant director-manufacturing engineering, and Harold N. Bogart is assistant director-manufacturing development in the new office.

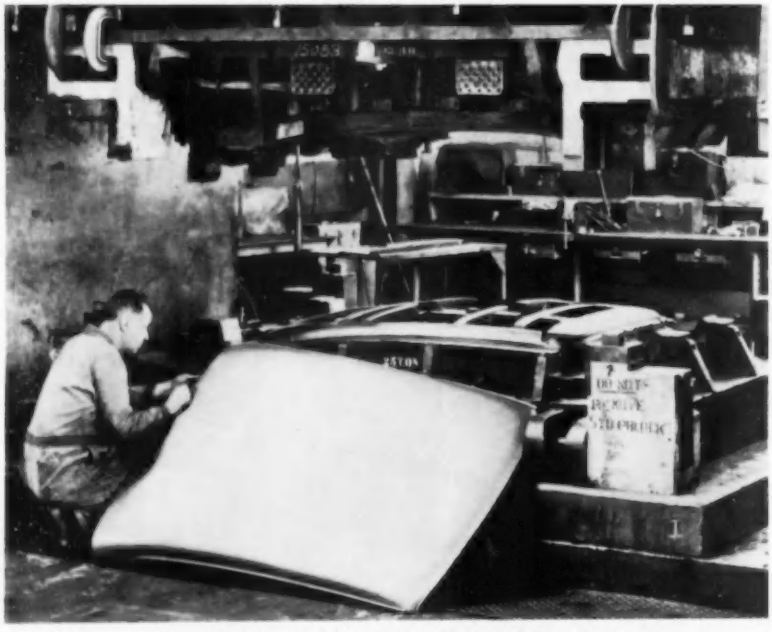
S-P Lost $3.2 Million In Third Quarter

Studebaker-Packard Corp. lost $3.2 million during the third quarter of 1960, leaving the company with a slim profit of $104,786 for the first nine months. S-P sales in the third period totaled $63.3 million, a drop from $75 million a year ago. The nine-month sales figure of $241.9 million reflected a decrease of $44.5 million from 1959.

A year ago S-P reported a nine-month profit of $15.4 million.

Board Chairman Clarence Francis said the third-quarter earnings drop was a result of lower automobile sales and heavy model changeover costs.

DETROIT MAKES DIES FOR ENGLISH CARS



This 850-ton press is being used by Active Tool & Mfg. Co. to try out cam-actuated restrike die employed in producing roof panels for English passenger cars. Operator examines panel just made on press. Three hundred and 62 dies for stamping body parts were started in England, completed in Detroit.

Patterson Retires After 40 Years

M. C. Patterson, 60, vice president of Chrysler Corp. and Dodge Div. general manager, has retired after 40 years' service.

He has been replaced by Byron J. Nichols, 47, who has been group vice president-automotive sales, since 1958.

E. C. Quinn replaces Mr. Nichols as top sales executive.

Mr. Patterson, a native of Scotland, started with Chrysler as a die sinker.

ASTM Names Marshall

Thomas A. Marshall, Jr., has been elected executive secretary of the American Society for Testing Materials. He formerly was senior assistant secretary of the American Society of Mechanical Engineers.

Studebaker Offers New Champ Pickups

The 1961 Studebaker line of trucks includes the new Champ pickups and the Transtar series of medium and heavy duty vehicles.

The Champ features a new 170-cu in. six-cylinder overhead valve engine that develops 110 hp at 4500 rpm. It has a torque rating of 156 at 2000 rpm. The compression ratio is 8 to 1.

Large valves in a staggered arrangement, a new design ram-type intake manifold and large passages in the head and carburetor throat are among leading features of the new engine.

In addition to the new six, two V-8 engines are available for the Champ. One is a 259 cu in. power plant with 180 hp at 4500 rpm. The other has a 289 cu in. displacement and develops 210 hp at 4500 rpm.

Available in ½ and ¾ ton models, the Champ is offered in 5000, 5200 and 7000 lb GVW ratings. A choice of 112 and 122 in. wheelbases is offered in the 5000 and 5200 lb models. The 122-in. wheelbase is standard on the 7000 lb models.

The Transtar medium and heavy duty series includes the one ton, 1½-two ton and the two ton heavy duty models.

One ton models have a 9000-10,000 lb GVW rating, a 131-in. wheelbase and stake body length of nine ft. It is powered by the 259 cu in. V-8 engine, with the 289 cu in. V-8 engine optional.

The 1½-two ton models have four-speed transmissions as standard equipment, with five-speed, direct or overdrive, transmissions available optionally.

The heavy duty models are powered by Torque Star 289 cu in. V-8 engines that develop 210 hp at 4500 rpm. Heavy duty four-speed transmissions are standard, with five-speed transmissions optional.

World Airlines Report 3 Pct. Profit in '59

The world's scheduled airlines ended last year with an estimated operating profit of slightly more than three per cent on total revenue of $4.6 billion, the director general of the International Air Transport Association reported.

Sir William P. Hildred said the industry is about half way through a re-equipment program which will bring the total jet fleet of IATA's 89 member airlines to about 6000 aircraft by the end of 1962. He predicted scheduled airlines should carry more than 100,000,000 passengers this year.

White Announces Compact Truck Line

White Motor Co. has announced a new line of trucks and tractors to be called White Compacts. Production will begin this month in Cleveland.

J. N. Bauman, White's president, said the new cab-over-engine vehicles are shorter and have a shorter wheelbase than previous models.

A swing of 50 degrees in either direction is made possible by the front wheel cut angle, he said. This is claimed to be nearly double that of similar trucks.

Intended for city delivery service, the trucks are said to be able, with optional components, to carry up to 14 tons. GVW. The tractors, designed for yard trailer, piggyback shuttling and intercity service, permit a gross combination weight of 30 tons.

Studebaker's New 1961 Champ Pickup Truck

NEWS

CONTINUED

Ford Earnings Down, Compact Sales Up

The compacts are making a deep impression at Ford Motor Co. and a deep impression in the company's earning power. For the first nine months of 1960, unit sales of Ford vehicles were 4.9 per cent higher than during the comparable 1959 period, but both dollar sales and net earnings were down.

The often repeated reason for this is the lower profit margin on the compact Falcon and Comet, both fast sellers. Passenger car sales at the three-quarter mark this year totalled 1,373,883 units, up nearly 100,000 from last year's 1,275,071.

Falcon accounted for 385,270 and Comet, in barely six months, totaled 139,270 units. Compact sales a year ago amounted to only 7638 Falcons in less than a month on the market. But last year the company sold some 28,000 higher-priced Edsels and 1,108,611 big Fords, compared to but 723,344 big Fords and a handful of Edsels this year.

Dollar sales were down from $3,991 million a year ago to $3,863 million this year, a drop of about 3.2 per cent. Earnings fell from $339.1 million a year ago to $316.2 million, or 6.8 per cent. Per share earnings were off from $6.19 to $5.76.

But Ford announced a 30-cent year-end bonus dividend and a 75-cent fourth-quarter dividend, making the 1960 dividend total $3 a share, highest in the five-year history of Ford public ownership. The 1959 dividend was $2.80.

Comet Convertible?

Current reports from Detroit indicate a Comet convertible may be forthcoming from the Lincoln-Mercury Div. of Ford, perhaps by next March or April, in time for the warm weather market.

Lark and Rambler American are the only other U. S. compacts to offer a convertible line. Studebaker-Packard reported good sales for its convertible in 1960, its first year. The American soft-top is in its first year.

N. Y. Boat Show To Set Record

Latest statistics on the 51st National Motor Boat Show, Jan. 14-22 in the Coliseum, indicate it will be the largest nautical display ever held in New York.

Space already has been allotted for 423 exhibits by 416 firms in the boating industry and trade. This is an increase of 23 companies over those listed at the same time last year. It is seven exhibits short of the 430 displays at the 1960 show.

Gas Turbine Engine Under Development

A Michigan research firm and a Wisconsin engine manufacturer are working on development of a 400-600 hp gas turbine engine for trucks, earthmoving equipment, oilfield, military, marine and other heavy-duty applications. The engine is being designed by Williams Research Corp., of Walled Lake, Mich., for the Waukesha Motor Co. of Waukesha, Wis.

Sam Williams, head of the research firm, said the engine is being designed for ruggedness, low maintenance and long operation. The 620-lb engine is 50 in. long and 28 in. wide.

It would be one of the largest of its kind. Mr. Williams recently installed a small 75 hp gas turbine in a military jeep for evaluation testing.

McIntyre Elected

John E. McIntyre, vice president and general manager, Sibley Machine and Foundry Corp., South Bend, Ind., has been named president of the Gray Iron Founders' Society.

FIRST BRITISH MODEL WITH DUAL HEADLIGHTS

The Humber Super Snipe for 1961 features dual headlights for the first time on any British car. Other changes include a re-styled body top, wrapped radiator grille and improved seating for six. The 180.1-cu in. six-cylinder engine develops 129.5 hp at 4800 rpm. It has Girling disk brakes.

Another new

B.F.Goodrich Chemical *raw material*

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Production and application knowledge as well as samples are available. Write Dept. GT-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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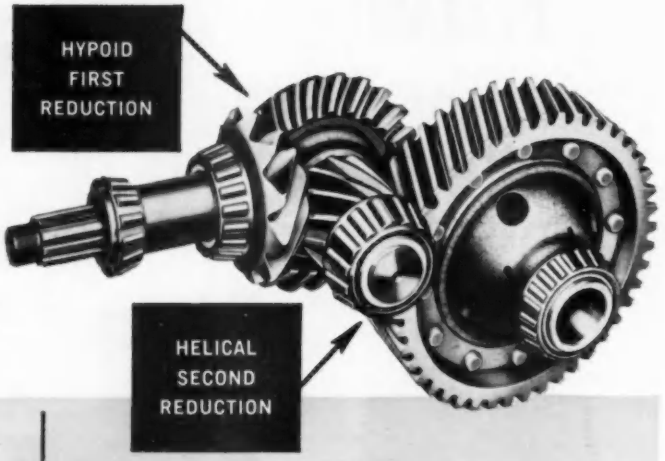
BALANCED HYPOID-HELICAL DOUBLE-REDUCTION AXLES

Timken-Detroit balanced hypoid-helical double-reduction gearing is unequalled for top performance and dependability. Outstanding advantages that make it the choice of heavy-duty equipment manufacturers and operators are: big, husky gears . . . greater flexibility in gear ratios . . . balanced gear set loadings . . . long life and low maintenance costs. The hypoid first reduction is 30% stronger than spiral bevel, and works in series with the second reduction to take an equal share of the load. In the helical second reduction, strong helical gears with a wide range of ratios insure balanced double-reduction gearing.



240 SERIES
SINGLE-SPEED, HYPOID-HELICAL DOUBLE-REDUCTION

Two full-sized gear sets form a balanced power train—with each gear set accomplishing a substantial reduction. This combination of husky hypoid first reduction gears coupled with rugged, wide-faced helical second reduction gears provides a double-reduction gear set that outperforms all others. Because the ratios of each reduction may be varied, you get a balanced power train with the larger selection of axle ratios for maximum operational versatility and performance.

340 SERIES
TWO-SPEED, HYPOID-HELICAL DOUBLE-REDUCTION

A true two-speed axle which provides two separate gear ratios through the use of two full-size helical gear sets . . . a "fast" ratio for maximum speeds and a "slow" ratio for greatest pulling power. Pick the most efficient gear ratio to meet your requirements of speed, load and road. Spring-flex power shifting provides simple, positive shifting with either air, vacuum or electric actuation. Timken-Detroit two-speed hypoid-helical double-reduction axles give a versatility and economy to trucking operations that is unmatched by other axle gear designs.

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INTERCHANGEABLE BALANCED DOUBLE-REDUCTION DRIVES

Another Product of...

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ROCKWELL R STANDARD

Transmission and Axle Division, Detroit 32, Michigan

Circle 116 on Inquiry Card for more data

NEWS

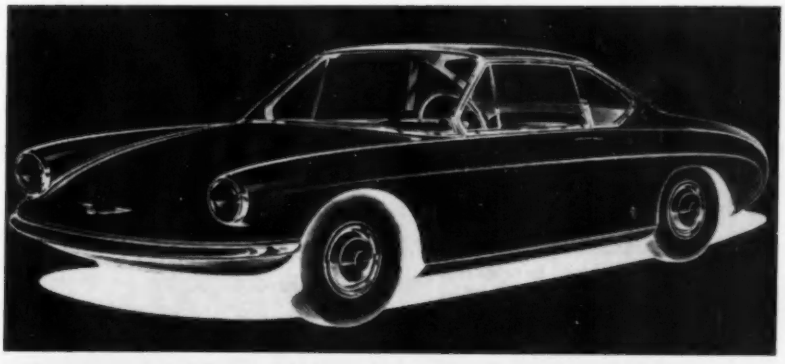
FEATURES

U. S. Compacts Lure Paris Show Crowds; New $4000 Citroen Convertible Displayed

American automobiles, normally tucked way back in European automobile shows, proved to be the center of interest at this year's Paris Auto Show.

The new American compact cars, in fact, were virtually the only new models being shown at the exposition, mainly because while British and Commonwealth producers brought out some innovations, they failed to show a completely new model.

Added interest in the American automobiles was caused by rumors that at least one of the "Big Three" U. S. manufacturers would put on the market next year something small enough to hit right in the center of the European industry.



A Corvair Special Coupe (upper photo) had wheelbase shortened to 100.3 in. The hood's line slopes down toward the front of the car in a smooth curve. Hollow treatment at front makes airstream give extra weight on front wheels for better riding. The Ferrari two-seater coupe (lower photo) has been designed to increase its sports styling. Air resistance has been reduced. Styled by Pinanfarina, they were displayed at Paris show.

By and large, little new from British or European plants made an appearance in Paris. Some British makers, it was said, are holding back for the Earl's Court, London, show, which follows close on the Paris opening. With the possible exception of Ford, rumored to have something new, no British manufacturer is known to have aces up his sleeve.

In production line models, probably the most serious attempt to put on something new in Paris was a convertible fashioned from the big Citroens—the DS 19 and ID 19. It was low-slung and faster than the sedan model of the same car, but its builders increased the price to the equivalent of about $4000 to French buyers.

Panhard Convertible

The French Panhard company also showed a convertible, a PL 17 model, but managed to lop a few hundred frances from its price. The only other new French car was the Renault Ondine, although it has been seen on French roads for months.

Britain, now enjoying a boom in its super-economical and tiny "mini" cars, showed station wagon versions of the B. M. C. "Mini-Morris" and Austin Seven, both of about 850 cc piston displacement and priced, for export purposes, at $1000.

Volkswagon came out again in the same form, with only one or two minor modifications that included more luggage room and a synchronized first speed gear in the transmission.

(*Turn to page* 25, *please*)

AI TABLOID

A process for determining the actual flaw size in metals and other materials by non-destructive ultrasonic means is described in an Air Force research report.

* * *

In high temperature tests of 35 intermetallic compounds, 19 test samples showed enough resistance to oxidation to be potentially suitable for structural service at temperatures up to 2300 degrees F.

* * *

In the second quarter of 1960, production of motorized fire apparatus by U. S. manufacturers totaled 678 units; 422 units produced on purchased chassis, and 256 produced on chassis of own manufacture. There were 535 pumpers, 52 aerial ladders and 91 miscellaneous apparatus.

* * *

The dollar volume of orders reported by industrial material handling equipment manufacturers in August showed an increase of nearly six points over July orders.

* * *

Molybdenum is now added to the soil for the promotion of growth of peas, beans, clover, peanuts, etc.—by treating the seeds before planting. Five lb of material treats enough seeds for 160 acres.

* * *

Filter bags made of Dynel synthetic fibers are proving efficient and economical for use in the continuous filtering-purifying units of swimming pools because of their resistance to water and to chemical treatments used.

* * *

Farmers no longer have to make hay while the sun shines. They can do it in the rain with air-tight nylon tarpaulins or hoods and a crop dryer which supplies heated air. As many as four wagon-loads can be dried simultaneously in this manner.

* * *

A new fluorocarbon rubber is reported to withstand prolonged exposure to temperatures of 700 degrees F.

The progress in development of man-made rubber is evidenced at the world's largest synthetic rubber plant at Houston, Tex. When Goodyear Tire & Rubber Co. acquired ownership in 1955, only four types of synthetic rubber were produced. Today, 11 different types are in production, including only two of the original four.

* * *

Plastic panels make much better windows than glass in plants where there is a hazard of explosion.

* * *

Synthetic rubies of gem grade can be made free from internal strains and thus resistant to thermal shock by a new process.

* * *

A new thermocouple for temperatures up to 2800 degrees C is based on tungsten against a tungsten-26 percent rhenium alloy.

* * *

A new type of corrosion resistant building employs stainless steel sections bolted together to form trussless arches and to allow an industrial building to be constructed of stainless steel alone.

* * *

A simple and precise method of calculating detonation parameters for gaseous mixtures is described in an Air Force report. Also available are two Navy reports on the effectiveness of water mist against ignition from radiant heat, and processes occurring during spontaneous ignition of hexane isomers, and an Air Force study of combustion phenomena at high pressures.

* * *

Filter felts made of polypropylene fibers have excellent chemical resistance.

* * *

Vacuum melting increases fatigue life of high temperature steel rolling contact bearings, according to an Air Force research report. Also released is a Navy report of the effects of titanium and titanium plus carbon on some elevated temperature properties of iron-aluminum alloys.

Robert A. Wolf has been appointed director of Cornell University's Automotive Crash Injury Research program.

New Models Bring Canadian Changes

The new model year brought a few changes in the line-up of automobiles in the Canadian market.

Chrysler Corp. of Canada dropped DeSoto and Dodge Polara, and will concentrate on Plymouth, Valiant, Dart, Chrysler, and Imperial. Dodge Lancer will not be available, even as an import.

General Motors of Canada will import the three new GM compacts and continue to build and sell Corvairs. But plans for an all-Canadian compact called Invader (AI June 15, P. 39) have been dropped.

New AMA Directors

Clarence Francis, Studebaker-Packard board chairman, and Robert S. McNamara, Ford Motor Co. vice president-car and truck group, have been named directors of the Automobile Manufacturers Association.

U. S. Compacts Lure Paris Show Crowds; New $4000 Citroen Convertible Displayed

(*Continued from page* 23)

An innovation among continental models was the new "Rush" engine produced by Simca, which now has a five-bearing crankshaft, normally reserved for sports cars and racing engines. This is the "Flash" engine of earlier Simca models, with output increased by about 10 hp.

Simca also installed a centrifugal oil filter at the end of its crankshaft in both the 52 hp "Rush" and 62 hp "Super-Rush" engines. The "Rush" powers the Etoile, Elysee and Monthlery models while the "Super-Rush" comes in the more elaborate and more expensive Ariane, Plein Ceil and station wagon models.

Renault presented three and four-speed gearboxes as well as better braking this year.

Porsche introduced new front and rear brakes equipped with 72 axial cooling fins.

Disk brakes were available on many more models than previously.

Peugeot, in a new model this year called 404, inclines its engine 45 degrees. The two-cylinder Vespa comes with a four-speed gearbox.

Mercedes-Benz put fuel injection systems into its models. The Ferraris on display were 12-cylinder models with three carburetors.

After the show had been running for a week, Ford's West German Div. introduced a new Taunus model with modern styling and a choice of 1500 or 1700 cc engines. More economical performance is claimed for both engines.

Three or four-speed gearboxes with all speeds synchronized are optional.

ALL-ALUMINUM FIRE TRUCK

Manufactured by Walter Motor Truck Co., Ridgewood, N. Y., rear-engined fire truck that protects Army missile installations can be transported by air. Each foam tank is seven ft long, five ft wide and five ft deep.

Municipal Transit Firm To Build Own Buses

In an unprecedented move by a municipal transit company, Niagara Frontier Transit of Buffalo, N. Y., disclosed it plans to manufacture its own buses.

President Roswell F. Thoma said his plan calls for the setting up of a bus-building assembly line in NFT's shops. The shops will turn out one bus a week "to take care of all our bus requirements," Mr. Thoma said.

Full-scale production, he continued, is about two years away but the company already is working on bus design, the materials that will be used, and type of construction.

One thing he said he will be striving for is lower steps that will make it easier to get on and off a bus.

E. J. Thomas Heads Auto Safety Foundation

E. J. Thomas, of Akron, O., board chairman, Goodyear Tire & Rubber Co., has been elected chairman of the board of trustees of the Automotive Safety Foundation.

Elected as vice chairmen were J. N. Bauman, president, White Motor Co., who will represent the automobile industry, and J. W. Keener, president, B. F. Goodrich Co., who will represent the tire industry.

New Electricity Source For Ignition Systems

A new source of electricity for ignition systems in small gasoline engines has been shown to the public by Clinton Engines Corp. It was developed by the Cleveland Graphite Bronze Div. of Clevite Corp. in cooperation with Clinton engineers.

The new device, called the "spark pump," is smaller than a man's fist and contains two ceramic parts that convert a single, short motion into a 20,000-volt charge.

The unit was designed for use in power lawn mowers, outboard motors, portable generators and other compact power equipment. Clevite and Clinton engineers say it replaces the conventional magneto, points, coil and condenser. Only the "spark pump," which supplies a spark each time pressure is applied, a switch and a spark plug are required.

In place of the usual coils, points, condensers and magnetos the new system generates electricity from a tiny artificial ceramic crystal by a phenomenon known as piezoelectricity. A constant 20,000 volts is produced each time pressure is applied to the crystal. With a switch and spark plug, it constitutes a complete ignition system for a small engine.

Among advantages cited for the new engine are elimination of ignition failure due to dust, oil, and other moistures; elimination of point oxidation during storage and non-use; longer plug life and lower repair bills because of service problems.

British Motor Corp. Cuts Output 12½ Pct.

A decline in demand for its cars has caused British Motor Corp. to place 23,500 of its 61,000 man force on short time. A spokesman said output has been cut 12½ per cent or 2000 units a week.

Officials said British Motor's expansion program, including erection of factories in Scotland and Wales would be unaffected. The expansion is expected to increase the concern's output to a million cars and trucks a year.

British auto makers have been experiencing a severe drop in sales because of tight installment buying controls in the home market and competition from U. S. compacts.

FOUR-CYLINDER BEDFORD VAN

Thirteen-in. wheels which drop floor height to 23¾ in. feature improved version built in England by General Motors' Vauxhall. Forward-control model is powered by Vauxhall engine. It is available in three axle ratios.

Political Climate Ends Moskvich Deal

A deal to import 10,000 Russian-made Moskvich cars has fallen through because of the "present political climate."

Robert J. Castle, Syracuse, N. Y., dealer, decided there was no U. S. market because of the international situation.

Castle had contracted to import 10,000 Moskviches in two years. When they first learned of the deal, automotive experts said they doubted the Soviet Union could deliver the cars.

Kaiser Aide Predicts Second Best Year

Present estimates indicate total shipments of U. S. aluminum producers and fabricators will make 1960 the second best volume year in the industry's history, according to D. A. Rhoades, president, Kaiser Aluminum & Chemical Corp.

Mr. Rhoades said his company expects total industry shipments in 1960 to come within four per cent of the 1959 record volume of 4.9 billion lb. Total volume this year is expected to reach 4.7 billion lb.

Autos Lead Increase In Stainless Steel

Stainless steel sales in the United States will pass the million ton a year mark by 1967, according to market research studies completed recently by International Nickel Co.

The survey reveals that demand for stainless steel in the automotive industry last year was 176 per cent more than in 1947. The next largest increase, 96 per cent, was in food processing.

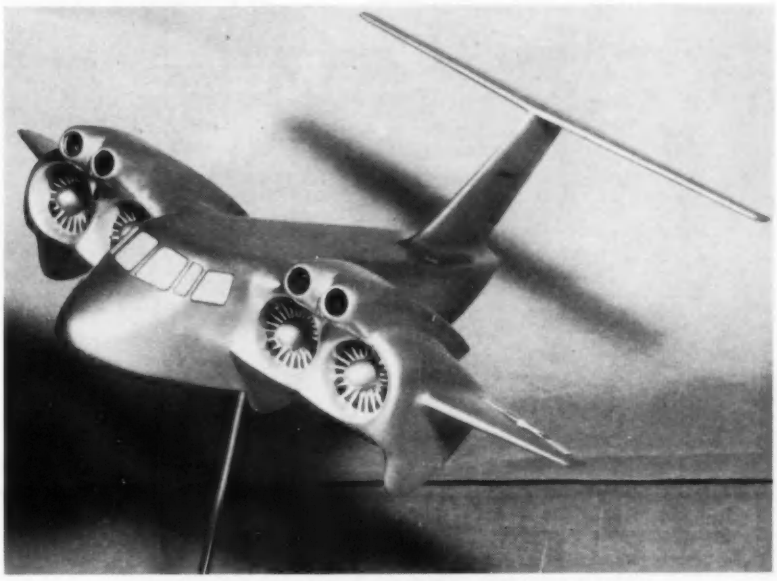
New Control System For VTOL Planes

Chance Vought Aircraft, Inc., has developed what it claims is a new system of propelling and controlling an aircraft that can take off or land vertically.

The system, still in the laboratory stage, is known as ADAM, an abbreviation for air deflection and modulation. It would employ four jet engines to drive ducted fans. Direction of thrust would be controlled by a flap system that would provide a smooth transition from hovering or vertical flight to forward flight without rotating of any large air frame parts.

Chance Vought says early studies indicate a transport with ADAM would fly at up to 460 mph, operate up to 45,000 ft and have a 3000-mi range. Engineers are studying use of the system for military and civilian craft.

In ADAM, two Pratt & Whitney J-60 jet engines are mounted on each side of the fuselage over a pair of ducted fans. The jets drive turbines which rotate the fans. Air sucked in by the fans is vented through a single nozzle on each side. Flaps at the rear of each nozzle deflect the stream of air toward the ground for vertical flight or behind the aircraft for forward flight.



Scale Model of Unique VTOL/STOL Aircraft

Sparton to Erect Electronics Plant

Sparton Corp. has announced plans for a $1 million military electronics plant in Albuquerque, N. M. The initial structure of 50,000 sq ft is planned for expansion to 100,000 sq ft during the first three years. Completion of the original building is estimated for February, 1961.

Plans call for an engineering laboratory, environmental test facilities, machine shop, precision printed circuit department, precious metal plating facility, ultra-clean assembly area and conventional assembly departments. The plant will be operated by Sparton Southwest, Inc., a subsidiary, although general administrative offices and research and development activities will be centered in Jackson, Mich., at the Sparton Electronics Div.

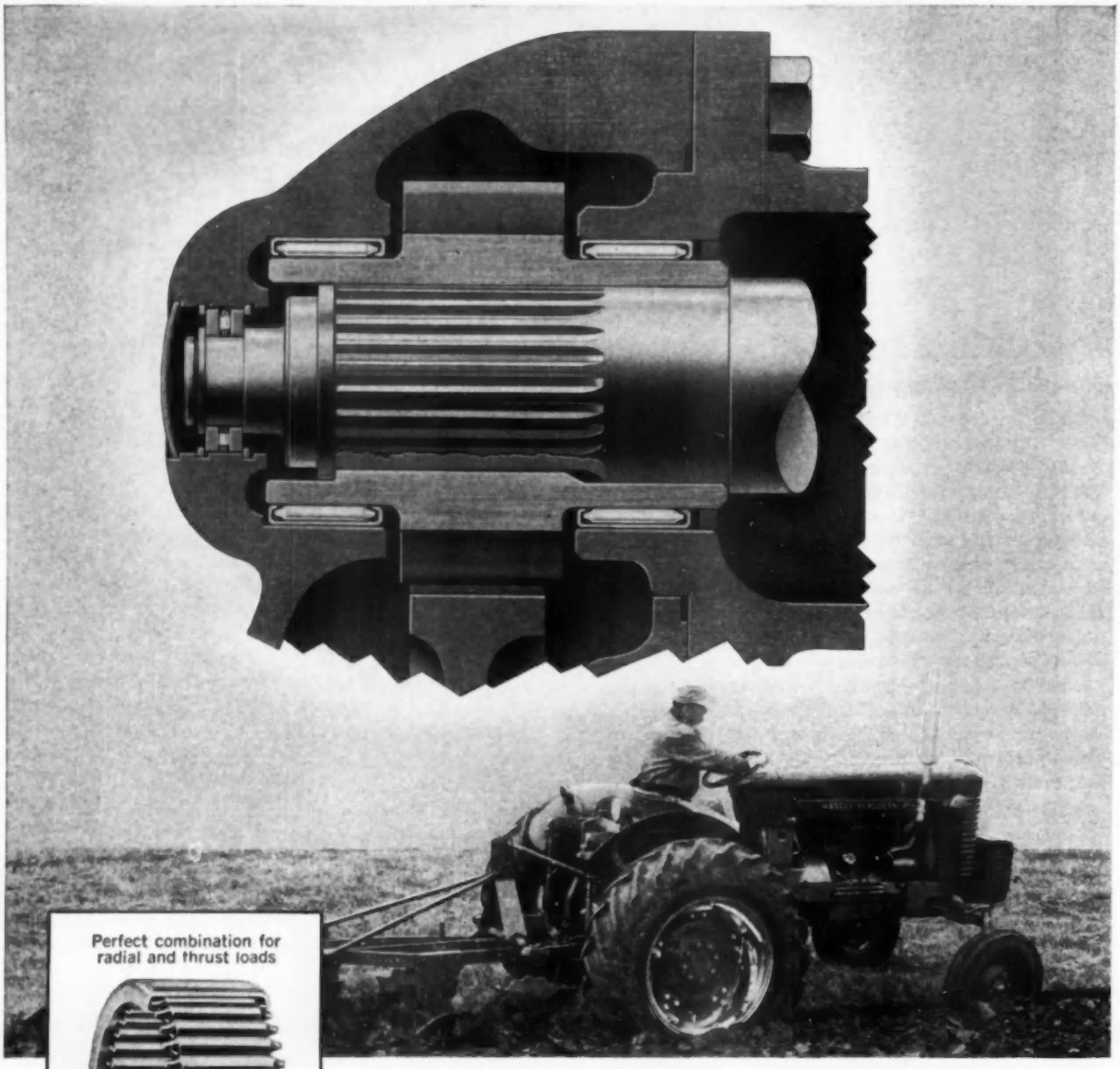
Navy Orders Seasprites

The Navy has ordered $21 million worth of HU2K Seasprite utility helicopters from Kaman Aircraft Corp. Delivery will begin in 1962. The Seasprite is capable of carrying submarine detection and attack equipment.

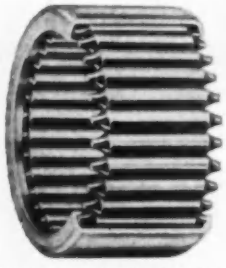
Tactical Air Command Accepts Thunderchief

The Republic F-105D Thunderchief tactical fighter, newest all-weather version of the aircraft that holds the world's 100 kilometer closed-course speed record, has been formally accepted by Brig. Gen. John N. Ewbank into Tactical Air Command's combat training program at Nellis Air Force Base, Nev.

Gen. Ewbank, speaking before some 200 invited civilian and military dignitaries, said the F-105D training program will serve as a postgraduate course for Tactical Air Command pilots. The 1400 mph fighter, capable of carrying nuclear weapons, both internally and externally, has been described as a "reusable guided missile."



Perfect combination for radial and thrust loads



Torrington Needle Bearing

Torrington
Needle Thrust Bearing

For the big pull in tractor performance... Torrington Needle and Needle Thrust Bearings

On the world-famous Massey-Ferguson Model 85 Tractor more than 40 Torrington Needle Bearings and Needle Thrust Bearings are used to smooth the transmission of power, operate the power steering, and to provide improved bearing efficiency and operation.

One outstanding application is the drop axle gear set, pictured above. Here, with their full complement of small diameter rollers, two 2¾" shaft size Torrington Needle Bearings provide higher radial load capacity than any other bearings of comparable cross section. To handle the thrust load, a single Torrington Needle Thrust Bearing, with two races, is used to complete the bearing team. The result is smooth, efficient, reliable performance – at greatly reduced cost over bearing arrangements previously used in this type of application.

The combination of Torrington Needle Bearings and Needle Thrust Bearings pays off wherever compactness and high bearing capacity are needed. For advice on *your* application, call on Torrington – maker of every basic type of antifriction bearing.

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MEN IN THE NEWS

Associated Spring Corp.—John B. Beckwith has been appointed manufacturing engineer.

General Motors Corp., Central Foundry Div.—George A. Hach has been named nonferrous sales manager.

Beech Aircraft Corp.—Max P. Eaton has been promoted to head of all quality control operations.

Budd Co., Automotive Div.—Thomas J. Ault has been appointed president.

American Radiator & Standard Sanitary Corp., Detroit Controls Div.—Ted G. Breitag has been named manager of manufacturing engineering.

Ford Motor Co., Styling Office—William H. Corrigan (far left) has been appointed industrial relations manager and William R. Dieckman has been named controller.

WARD LaFrance Truck Corp.—**William B. Pashkow** has been appointed president.

Stewart-Warner Corp., Alemite and Instrument Div.—**Earl A. Danciu** has been appointed manager of original equipment sales.

Link-Belt Co.—**T. Webster Matchett, George Ramsden** and **Gerald A. Stone** have been named Pershing rd. and Caldwell plants and North Central Div. managers respectively.

Electric Autolite Co.—**U. Seldon Snellbaker** has been named manager of the Oakland, Calif., battery plant.

General Motors Corp., Allison Div.—**William A. Gossett** has been promoted to comptroller.

White Motor Co., White Truck Div.—**Donald B. Seem** has been named director of advertising and public relations.

Humble Oil & Refining Co., Esso Standard Div.—**Charles O. Peyton** has been named manager of industrial and consumer sales.

Cummins Engine Co., Inc.—**D. J. Cummins,** vice president-engineering, has taken a leave of absence after 40 years' service.

General Motors Corp., Defense Systems Div.—**Dr. John L. Schwab** has been named head of the advanced planning department.

Allis-Chalmers Mfg. Co.—**Walter F. Strehlow** has been promoted to senior consulting engineer for the Tractor Group, and **Robert S. Reaves** has been appointed chief engineer, West Allis, Wis., tractor works.

B. F. Goodrich Co.—**Anselm Talalay** has been named general manager of B. F. Goodrich Sponge Products.

Universal-Cyclops Steel Corp., Refractomet Div.—**John G. Sauer** has been named sales manager.

Parker-Hannifin Corp., International Div.—**William M. Hardy** has been appointed eastern co-ordinator.

Budd Co.—**Ernest E. Brower** has been promoted to western manager of automotive sales.

Borg-Warner Corp., EMCOR Ingersoll Products Div.—**Edward P. La Kaff** has been promoted to chief engineer and **Donald R. Carlson** has been named division sales supervisor.

American Metal Products Co., Automotive Div.—**Alexander A. Dolega** has been promoted to assistant comptroller.

American Motors Corp., Kenosha Div.—**Earl L. Monson** has retired as assistant chief engineer after 40 years.

Mack Trucks, Inc.—**Thomas A. Simms** has been named plant engineer at Hagerstown, Md., and **Truman H. Bimesderfer** has been appointed plant manager.

Studebaker-Packard Corp., Automotive Div.—**Roy B. Bender** has been promoted to vice president.

Beech Aircraft Corp., Boulder Div.—**W. E. LaVelle** has been appointed manager of manufacturing.

General Motors Corp., Defense Systems Div.—**Dr. Norman Lee Barr** has been named head of the biological and systems department and **Donald Friedman** heads the land operations department.

Electric Autolite Co.—**Earl R. Fiene** has been appointed director of automotive original equipment sales.

Armstrong Cork Co.—**M. D. Ford** has been promoted to general manager of manufacturing services.

Necrology

Robert Abbott, retired president and general manager of Raybestos-Manhattan (Canada) Ltd., died Oct. 9 in Peterborough, Ont.

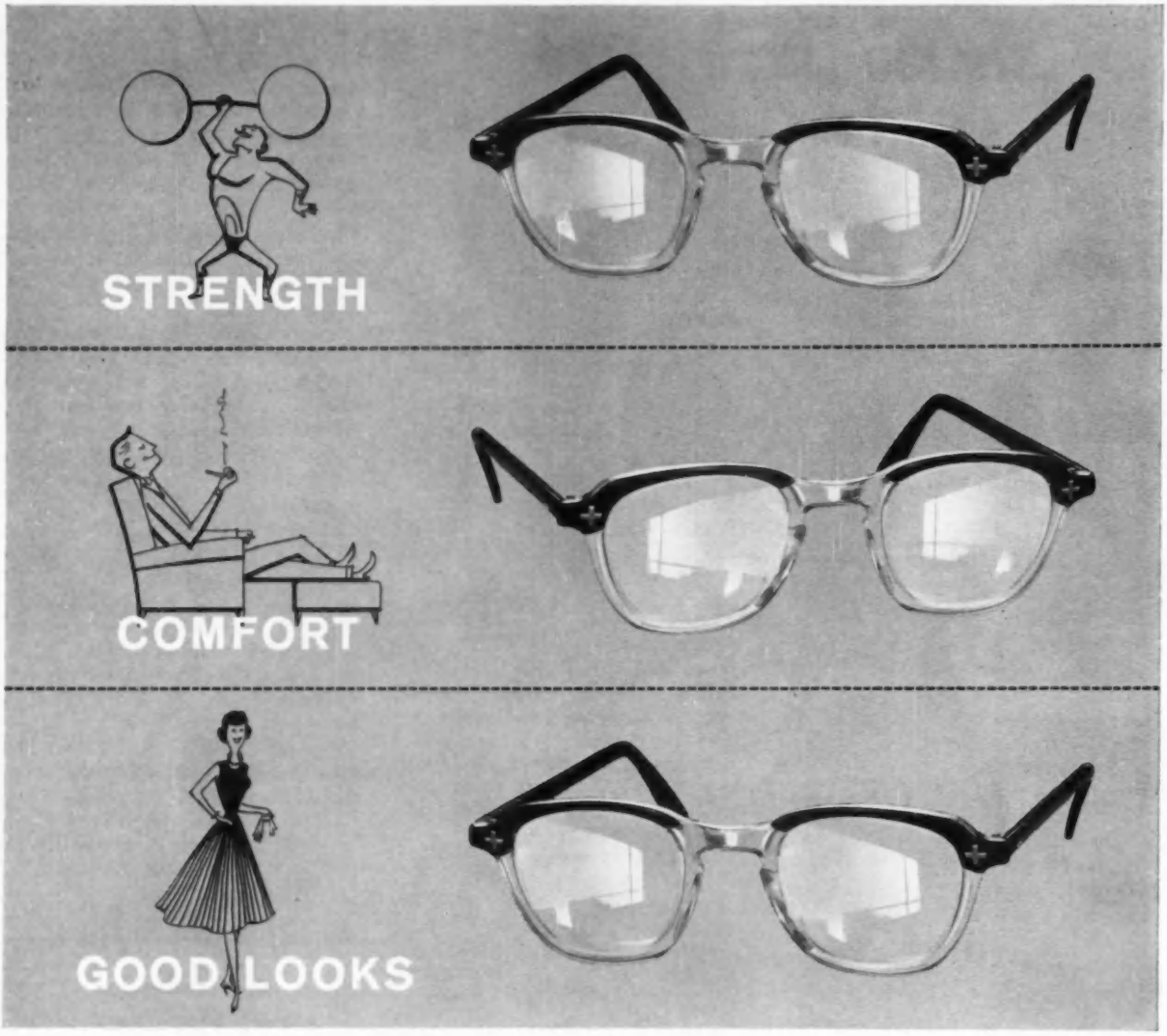
Arnold G. Schilberg, 54, automotive design consultant for A. O. Smith Corp., died Oct. 5 in Milwaukee.

John J. Murtha, 65, retired plant supervisor for the Cadillac Div. of General Motors Corp., died Oct. 3 in Highland Park, Mich.

Bernard F. Anger, 78, pioneer custom auto maker, died Oct. 3 in Milwaukee.

W. L. Tomlinson, 53, manager of automotive sales for the Pittsburgh Plate Glass Co., died of a heart attack Sept. 30 in Detroit.

Albert L. Hopkins, 70, retired director of standards and quality for the Buick-Oldsmobile-Pontiac Div. of General Motors Corp., died Sept. 28 in Royal Oak, Mich.



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The B&L complete line assures you the perfect fit for each worker. And for *complete* protection: Redy-Fit Side Shields, available as part of the frame or as interchangeable units. Check with your B&L supplier, or drop a line to Bausch & Lomb Incorporated, 98611 Lomb Park, Rochester 2, New York.

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an Editorial

A Time for Decisions

WITH EVENTS OF THIS MONTH in the political scene uppermost in national affairs, it is timely to focus attention on the future decisions that industry needs from Washington leaders. A top Chrysler executive recently pin-pointed one of the automotive industry's greatest needs. As a keynote speaker at the Forty-Seventh Annual Meeting of the Manufacturers Association of Syracuse, R. S. Bright, group vice-president in charge of automotive manufacturing for Chrysler, called for revision of tax policies governing depreciation allowances.

HIS COMMENTS WERE ESPECIALLY APPROPRIATE because at Syracuse, Chrysler has just built a new 400,000 sq ft plant to replace an older plant in the same city. When the DeWitt plant at Chrysler's New Process Gear Division is in full operation, in the new facilities, several hundred more people will be employed than previously. This example, which was graphically portrayed by Mr. Bright, illustrates the way in which the automotive industry supplies a major need of the public for "economic growth." The company and the community in which the plant is located are doing their parts to assure economic growth. The additional factor needed, Mr. Bright emphasized, is for the Federal government to do its part and modernize Federal tax policies governing depreciation allowances.

TO ILLUSTRATE HIS PRESENTATION, Mr. Bright used some data from the survey entitled "Making Production Pay" which appeared in the September 1 issue of AUTOMOTIVE INDUSTRIES Magazine. Referring to the type of equipment that will be used in the company's new DeWitt plant, Mr. Bright said that a recent study (AI Sept. 1) of the efficiency of metal-cutting machine tools showed that drilling and grinding tools are now 23 per cent more efficient than they were 10 years ago, milling tools are 29 per cent better and gear-cutting and finishing tools are 46 per cent better than in 1950.

EVERY MANUFACTURER WOULD LIKE to take full advantage of this kind of technical advancement, Mr. Bright continued. "But the present tax policy on depreciation allowances works against the modernizing of equipment in all business, including—I assure you—the automobile business."

THE PROBLEM SHOULD BE VIEWED in a clearer light by government officials, it was pointed out. In drawing up and enforcing tax legislation governing depreciation, too many people in government still tend to think primarily in terms of how long it takes a machine to wear out and not in terms of the ever-shorter length of time it takes a competitor, domestic or foreign, to make today's equipment hopelessly obsolete.

FUTURE MONTHS WILL BRING UP MANY schedules of important legislative proposals and programs. The program for modernization of tax legislation governing depreciation should be placed well up in the forefront of major projects scheduled for early enactment. Throughout the industry, all executives could help to bring this about by making certain that the new administration is keenly aware of the urgent need for favorable action on this important proposal.

Hartley W Barclay

Editor and Publisher

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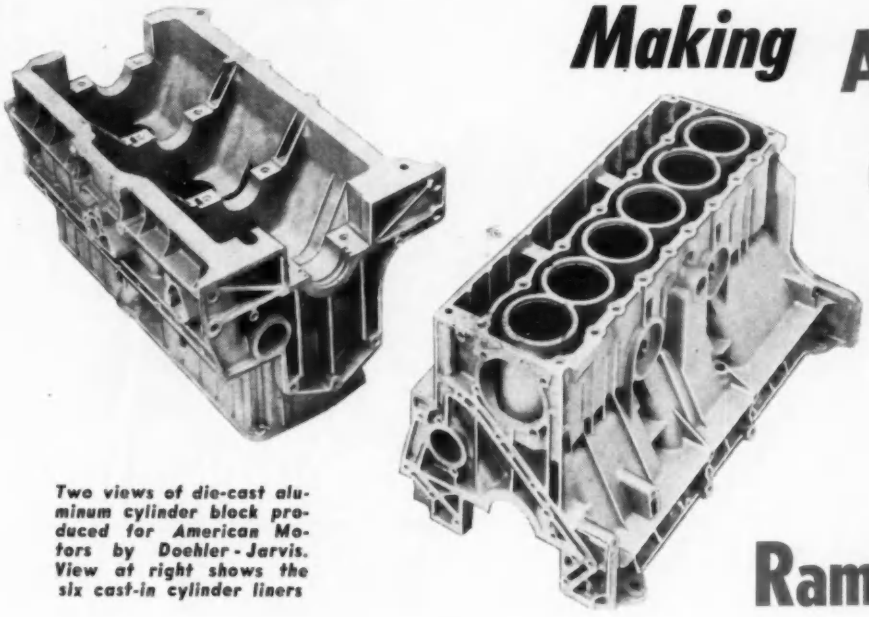
Making ALUMINUM CYLINDER BLOCKS for the Rambler Classic Six Engine



Two views of die-cast aluminum cylinder block produced for American Motors by Doehler-Jarvis. View at right shows the six cast-in cylinder liners

By
Joseph Geschelin
DETROIT EDITOR

AN automotive "first" has been scored by American Motors in launching its aluminum OHV six-cylinder engine for the 1961 Rambler Classic Six. It is a first because it is the first example of a die-cast aluminum cylinder block for an automobile engine to be placed in volume production in the USA.

The aluminum block engine is the result of a cooperative research and development program between American Motors and the Doehler-Jarvis Division of the National Lead Corp., which will perform the die-casting operation in its Toledo, Ohio, plant.

The cylinder block, as illustrated, is an intricate die casting weighing 67 lb, including 14 lb of cast iron liners. The six centrifugally-cast, cast-iron liners are supplied by Perfect Circle and are cast as inserts by the bimetallic interlock bond technique recently developed by Doehler-Jarvis. The OD of the liners is of porous character to aid in producing a strong mechanical bond between the liner and the aluminum casting. Cylinder bores develop a Brinell hardness of 230-260 to account for reduced wear.

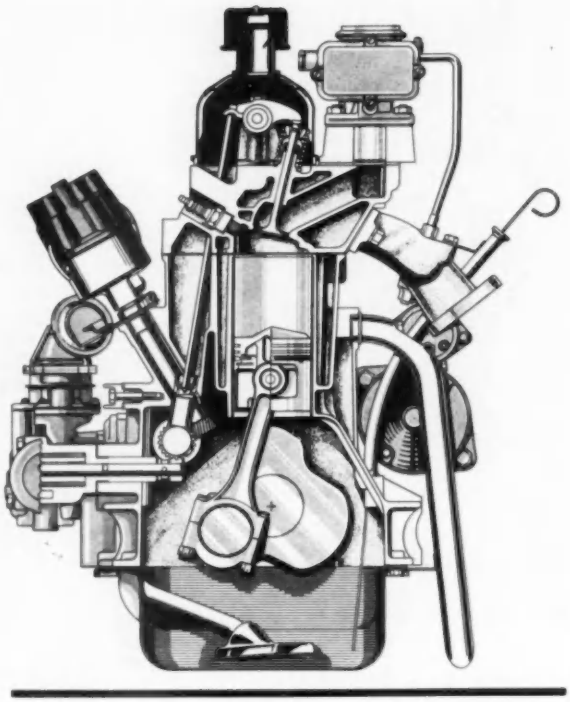
Not only is the casting intricate, it also incorporates some features that have been shunned by die-casting experts heretofore. For one thing, the die has nine loose pieces—the six liners and three pieces for camshaft bores. Loose pieces ordinarily complicate the die-casting operation and slow down the cycle appreciably. In this instance, Doehler-Jarvis not only developed its own die-casting machine, it also worked out suitable automation for loading and unloading which handles the loose pieces and loads them automatically into the die. By means of automation, the floor-to-floor time is limited only by the time it takes to force the charge of molten metal into the die plus the interval required for cooling the casting.

In addition to these details, the block is of drop center design and has deeply cored water jacketing. Once the design of the die was established, it was also found feasible to core the camshaft bores, as well as the entire main

oil gallery, together with the smaller communicating oil holes. As a result, this block has less machining steps than does a similar cast iron block.

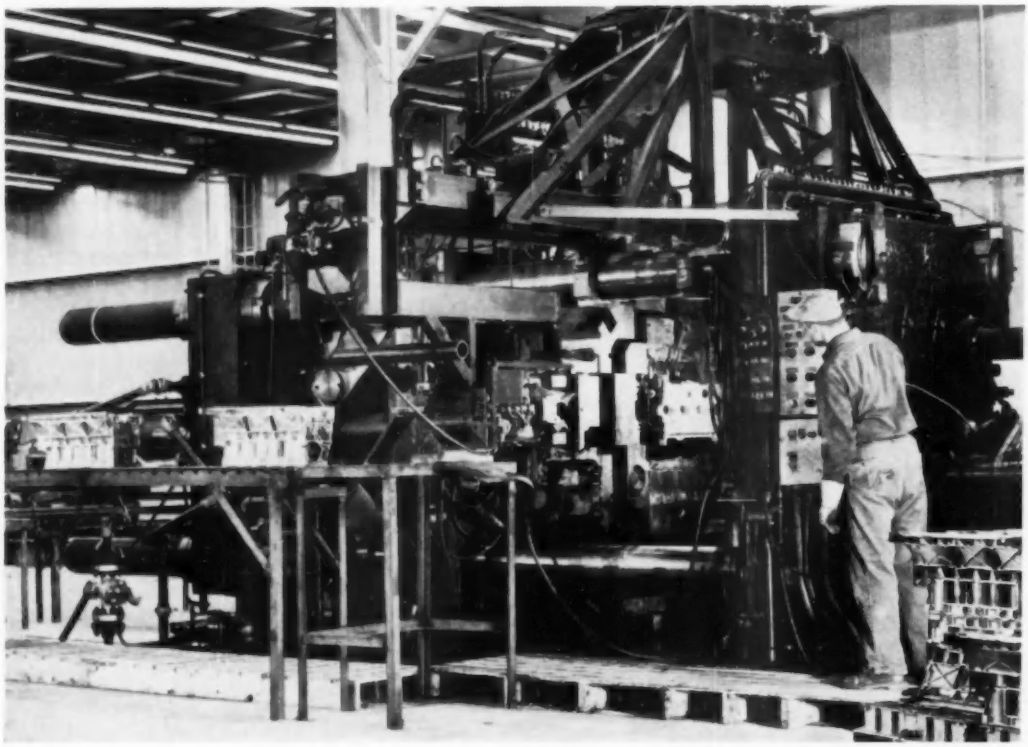
This project involves not only the evolution of a block design but the development of the intricate die and, finally, the design and manufacture of a unique 2000-ton die casting machine. The 65 lb of aluminum required for one shot injection is poured into the hot sleeve by means of an automatic ladle, then is injected into the die in 0.3 seconds under a pressure of some 8000-psi. Dies are locked against this high pressure by large hydraulic cylinders as well as mechanical locks for the large side cores. Some idea of the magnitude of the pressures involved here may be gained from the fact that metal pressure against one of the large side cores is of the order of 3.3-million lb.

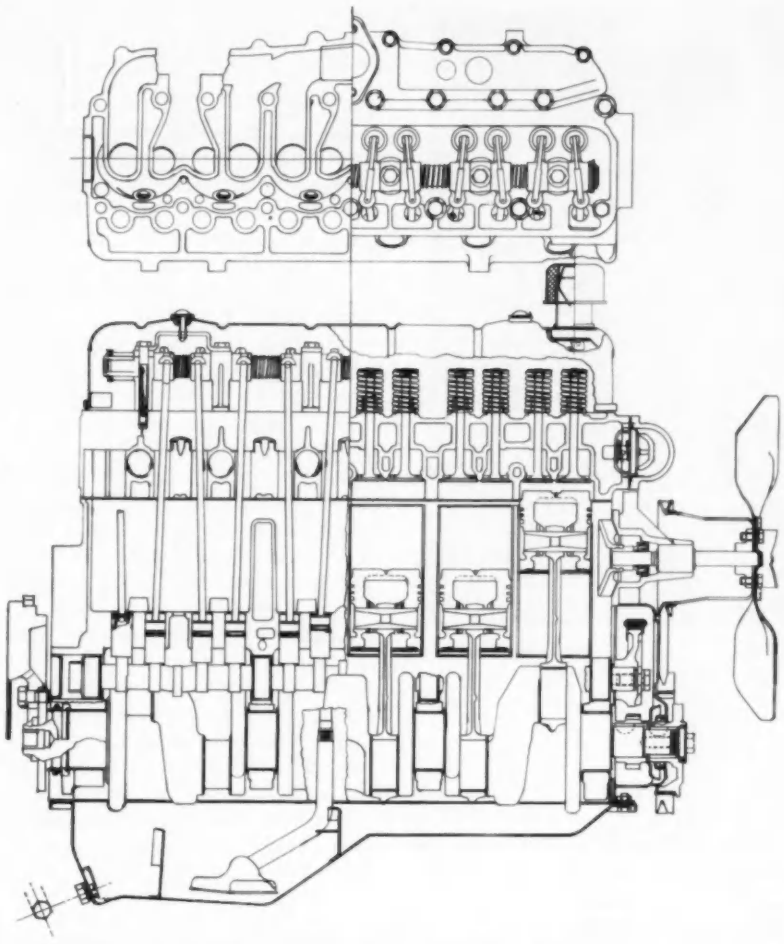
The Doehler-Jarvis die casting machine is illustrated here. In the center may be seen the rail for the unloading mechanism which removes the block from the die and transfers it to the conveyor at the left. There is a similar rail on the opposite side. This one carries the fixture on which are mounted the sleeves and other loose pieces. Sleeves are heated in an adjacent



Transverse cutaway view of Rambler Six engine

One of battery of special 2000-ton capacity die casting machines used by Doehler-Jarvis for production of AMC cylinder blocks





Longitudinal sectional view of new engine, with part cutaway view of cylinder head

furnace, then pressed over mandrels, and loaded into the fixture. The fixture is arranged to move into the die opening and, when properly aligned, the loose pieces are pushed into place in the die.

Producing the die casting is only one phase of the operation. Castings are transported to the finishing department where they are first water tested to assure tightness. Following this, they are moved to a Magnaflux Magnaglo cabinet where each liner is inspected under black light to assure freedom from cracks and surface imperfections.

Accepted castings then move to the metal cleaning operations where flash is removed in three press operations.

Despite all the pains taken to assure smooth transition of sections and despite refinements in die design and the high metal pressures, there still remains the question of occasional porosity which may or may not be detrimental. Although porosity is under control, Doehler-Jarvis has instituted a destructive inspection which will be carried out for some time after production has been established. An operator selects a random block and saws designated sections for examination. Results to date indicate that porosity is indeed under control, preliminary examination occasionally showing small pin holes in heavy sections where there is no risk of failure.

In keeping with Doehler-Jarvis practice, the company produces its own alloys and employs proprietary metal formulations. The AMC block is made of a special composition containing about 12 per cent silicon without copper additions. It also contains other ingredients yet unnamed. The aim has been to produce a casting that is easily machinable, with high corrosion resistance, and with the necessary high physical properties.

It is noteworthy that after the first sample die castings were produced from the initial die, an extensive stress analysis program was inaugurated to make sure the structure was free from stress concentrations that might lead to failures. Such work, up to now, has been done by experimental stress analysis, employing brittle lacquer. The group felt that this procedure would be too time-consuming and

Die-cast aluminum blocks are pressure tested in this conventional type water testing machine

Following water testing and Magnaglo inspection, blocks are routed to cleaning section where flash is removed in stages in three presses, one of which is shown

eventually one of the Doehler-Jarvis research men came up with a photo stress analysis technique in which the block is coated with a plastic coating and viewed under polarized light. Point by point checking, first under static loading, later under dynamic loading, uncovered areas of stress concentration which were eliminated by modifying radii and by the introduction of strategically placed ribs which transferred strains into the body of the casting.

Modifications in the die were made in accordance with the stress analysis findings.

Mention was made earlier that this block has less machining than a similar block in cast iron. AMC has revealed that at the start of the program they ordered a special transfer machine for 1961 cylinder block production and deliberately designed it for a cast iron block just to be on the safe side. When it became evident that the aluminum block would be available, the machine was suitably altered to accommodate higher cutting speeds and feeds. At the same time a number of heads were placed on an idle cycle since they would not be required. The point is that if the machine had been designed for an aluminum block at the start it would have been more compact and with less head. ■

Chrysler Develops 3-D Plotting Device

Research engineers at Chrysler Corp.'s Missile Div. have developed a new three-dimensional plotting device which will graphically display in color the paths of rockets, aircraft, satellites, submarines beneath the sea, electrical and magnetic fields, and weather fronts.

Called the 3-D Plotter, it is the first in a series of new concepts which Chrysler missile engineers believe could revolutionize plotting techniques for the space age and for current airport approach systems.

Coupled to radar and a computer, the 3-D Plotter will permit simple and instantaneous evaluation of trajectories of missiles, and flight patterns of aircraft. It could record for easy viewing the approach and trajectory of enemy missiles which had been detected at great distance.

Simply, the 3-D Plotter works like this:

A stylus traces a colored pathway through a tank of clear gelatin. The motion of the stylus up and down, back and forth, side to side, is imparted by three motors which in turn are activated by a system of amplifiers, gears and servo mechanisms.

The 3-D Plotter is considered by Chrysler scientists as a "natural" to plot weather fronts, showing lines of turbulence, temperature and pressure variations, and the movement of huricanes.

82 Pct. of Helicopters Were Built in U. S.

Helicopters built in the United States comprise about 82 per cent of all 'copters in service. A survey by the Helicopter Council of the Aerospace Industries Association reveals 262 operators in 63 foreign countries.

The first list of foreign military, government and commercial operators shows there are 1622 helicopters in operation and that 1370 were made in the U. S. At present, foreign operators have 184 helicopters on order, of which 103 are U. S. models.

Guenther Named to Replace Minor

John C. Guenther has been named Plymouth-De Soto-Valiant Div. director of advertising to replace Jack Minor, who was forced to resign because of outside interests.

Mr. Guenther has been on the staff of Vice President B. W. Bogan. Earlier, he was executive assistant to the general manager of the Plymouth Div.

Rubber Consumption Up

United States consumption of new rubber amounted to 125,836 long tons in August, 1960, compared to 114,642 tons in July and 138,055 tons in August, 1959.

The New Cars for 1961

By Joseph Geschelin
DETROIT EDITOR

Emphasis on More Compacts and Smaller Cars

OFFERINGS of the motor vehicle producers for the 1961 model year reveal even greater emphasis upon compacts and models that fit between compacts and the regular line. With the introduction of the Lancer in the Dodge line, Chrysler Corp. now boasts two compacts—Valiant and Lancer—as well as the larger Dart. Ford Motor Co., on the other hand, has Falcon and Comet as its entries in the lower priced field. There is a new model in the Chrysler-Imperial Division. This is the Newport, a lower-priced luxury car with a 361-cu in. engine.

Last year Chevrolet introduced the Corvair as its big number in the low-priced market. This year General Motors has blanketed the field with smaller cars—the Buick Special, Pontiac Tempest, and Olds F-85. These entries, however, are higher priced than the so-called compacts, offer better appointments and much greater performance.

Despite the spate of rumors earlier this year DeSoto made its appearance for 1961, although there are fewer models and a moderate-sized powerplant—for a Chrysler Corp. car. Similarly the Lincoln-Mercury Division has introduced a full-sized, in fact, big and powerful, Lincoln-Continental car with sports car styling.

Thunderbird is an entirely new car with easier entry and egress through elimination of the dog-leg in front. One of its uncommon features is an optional steering wheel which can be moved 10-in. to the right for the driver's comfort in entering and leaving. The entire column is pivoted, mechanically controlled by the transmission gear change lever. It locks and unlocks in "park" position.

AMC enters 1961 with entirely restyled cars—three of them. The American is beautifully styled on its short wheelbase, offers an outstanding convertible priced lower than any convertible of domestic origin.

Cadillac enters the field with an entirely restyled line of cars. Interesting feature is that the new Fleetwood Sixty Special has been made distinctive, eliminating the Eldorado Brougham. Some time later Cadillac will release a short-deck sedan with rear deck seven inches shorter.

Best news for the car buyer is that the dogleg at the windshield is gone; and so are the prominent rear fins—on most makes. With the elimination of the dogleg has come more headroom, more comfort both front and rear, and easier entry and egress. One can now get in and out of the new cars without learning how.

Besides the sheet metal changes on most cars, many makes have smaller wheelbase and some reduction in overall length and weight. Incidentally, the compound curvative windshield has

given way to a simpler form on many makes.

Bodies for all of the new compacts and the in-between sized cars are of unitized construction. All Chrysler Corp. cars now have unitized bodies, except the Imperial. One optional feature emphasized by Chrysler last year is gone. We refer to the swivel seat, now available only on selected models of the Chrysler-Imperial line.

Profiting by the experience of the first generation compacts, more bodies utilize galvanized or zinc-coated steel for rocker panels and underbody parts.

Again from the standpoint of car owners there has been greater emphasis upon an improved ride, resulting from lower rate springs, more rubber cushioning all around, improved and recalibrated shock absorbers, zero caster on the Lark. Gone from the scene, however, is air ride, once thought to be the answer to a superior ride.

Introduction of entirely new cars this year has brought with it many novelties in chassis design and layout. More so, in fact, than the industry has seen in many years. Just take a look at a few examples: Buick has eliminated its traditional torque tube drive, now has a three-link suspension at the rear on its regular models. In addition, frame configuration has been changed radically.

Cadillac has changed front end suspension radically by the introduction of an adjustable strut as the lower support. This permits extended and finned front brake drums, together with larger wheel cylinders to mark an improvement in the brake system.

Oldsmobile has abandoned rear leaf springs, returning to coil springs all around, employing a four-link suspension system at the rear.

On the small GM cars, both the Olds F-85 and Buick Special feature a two-piece drive line with a double-Cardan, constant velocity joint. This reduces the body tunnel materially.

The Pontiac Tempest, on the other hand, is entirely unorthodox, although somewhat similar in external appearance. It has a transaxle in the rear, combined with a front mounted engine. With the transaxle, the Tempest employs a fabricated rectangular - shaped torque tube which has a slight concave curvature to reduce tunnel height. If these novelties are not enough for one car, Tempest has a ⅝-in. diameter forged steel drive shaft which is quite flexible and is restrained from whipping by means of two bearings in the torque tube.

Both Mercury and Lincoln-Continental cars have front and rear suspension features that permit the wheel to move backward upon encountering an obstruction or hole, thus reducing shock and making for a smoother ride.

There is a growing trend to a reduction in the number of lubrication points. Perhaps the most striking development in this area is the principle of extended lubrication periods. Ford, Mercury, and Lincoln have struck out boldly by placing chassis lubrication on a 30,000 - mile cycle; engine oil changes on a 4000-mile cycle. This is an experiment that's good news for the car owner not so good for service stations and refiners.

In this connection Cadillac sprung a surprise by making the chassis lubricated for life, thus requiring no service station lubrication except for the engine and transmission.

Engines

The engine picture has changed materially. It is not confusing but quite complicated and no longer subject to generalizations. Consider first the new ones. The B-O-P small cars employ the new GM all-aluminum V-8 engine. Cylinder block and heads are made by a semi-permanent - mold technique with centrifugally - cast cylinder liners castin in the block. This engine is standard on the Olds F-85 and Buick Special, optional on the Tempest.

Standard on the Tempest is an inclined 4-cylinder engine, actually one bank of the Pontiac V-8.

The Comet and Falcon both offer a 170-cu in. Six to supplement the smaller engine.

AMC unfolded a distinctive all-aluminum OHV 6-cylinder engine. Its most impressive feature is a beautifully executed die-cast block, a joint venture of AMC and Doehler-Jarvis. The cylinder barrel is a cast iron liner castin as an insert in the die casting.

Studebaker Lark boasts an entirely new OHV Six. It has the same bore and stroke as the old L-head but packs considerably more performance.

Oldsmobile now supplies the basic 394-cu in. engine for all regular models, with changes in compression ratio and carburetion to suit the different models. The same applies to Pontiac whose 389-cu in. V-8 is used on all regular models with changes in compression ratio and carburetion. In fact, one option has three, two-barrel carburetors.

It is difficult to generalize the engine picture for other reasons. For example, there are more Sixes in production than the industry has had in many years. There is greater emphasis upon economy, upon lower compression ratios with consequent tolerance of regular fuels. There is more use of single-barrel and two-barrel carburetors.

Having said this, we look at the record. We find that the Dart has an option of the 383-cu in. Ram-induction engine and so do Plymouth and Dodge. We find the Tempest Four available in five different options of carburetors and compression ratio; the Pontiac 389-cu in. engine available in eight different versions, including one with three, two-barrel carburetors.

So while the horsepower race is dead and gone, many makes have special engine options for the benefit of those participating in racing.

Carburetor variations have gone hog-wild. We have listed: one-barrel; two, one-barrel; two-barrel; four - barrel; two, four - barrel; three, two-barrel; and on the Corvette an offer of two, four-barrel carburetors as well as fuel-injection.

Nevertheless, these variations in compression ratio and carburetion now hold the key to a simplification in the production of a basic engine line. Designers have elected this route to manufacturing economy without penalizing the sales department from the standpoint of performance and cost. Coupled with these variations in options most makes also offer a variety of

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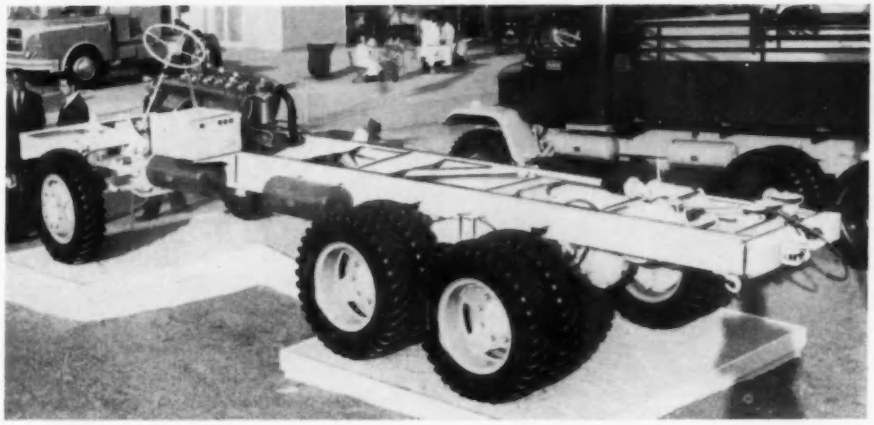
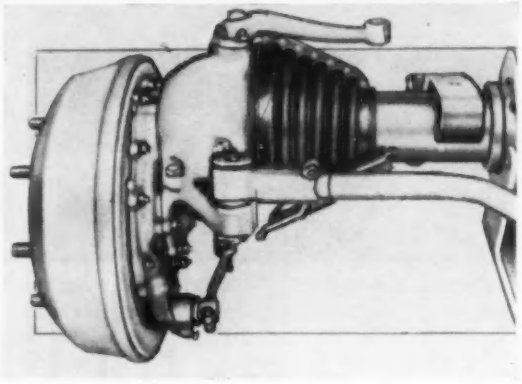


Praga V3S 6x6 off-highway chassis has raised center axles giving a ground clearance of 16 in. Drive from the 92-hp air-cooled Diesel is through independent propeller shafts to all three axles. Close-up shows offset gearing on one of the front wheels.



Czechs Show Latest Vehicles at Brno Fair

By David Scott
BRITISH CORRESPONDENT

AUTOMOTIVE exhibits at the Brno International Fair in September indicated that Czechoslovakia is gradually increasing the range and variety of its vehicles and farm tractors in an effort to penetrate world markets.

A new model of the Skoda car was the Octavia Combi station wagon, based on the existing swing-axle chassis with a 74.5 cu in. engine and tubular backbone frame. With a total load capacity of 880 lb, it features an underfloor compartment for spare wheel and tools, accessible through an external drop-down panel beneath the tailgate. This is on pivoting arms and is released by an internal pull-cord. There is also a storage compartment inside the left tail fin for a fuel can or other bulky items, reached via a detachable interior panel.

Another variant was the Skoda Octavia Touring Sport, combining the two-door sedan body of the Skoda Octavia with the twin-carburetor 66.4-cu in. engine of the Felicia roadster.

One of the new truck models displayed at Brno was the Skoda 706-RTTN, a tractor version of the Skoda 7-ton chassis. Designed for hauling semi-trailers of up to 28 tons, it is powered by a 718.6-cu in. six-cylinder Diesel developing 160 hp at 1900 rpm. Transmission comprises a 5-speed gearbox and double-reduction axle. The over-engine cab is 7½ ft wide and seats four people in two rows. Also on show was the latest model of the Praga V3S five-ton 6x6 chassis designed for heavy-duty off-highway and military use. It features raised-center axles with spur gearing to each wheel, which give a minimum ground clearance of some

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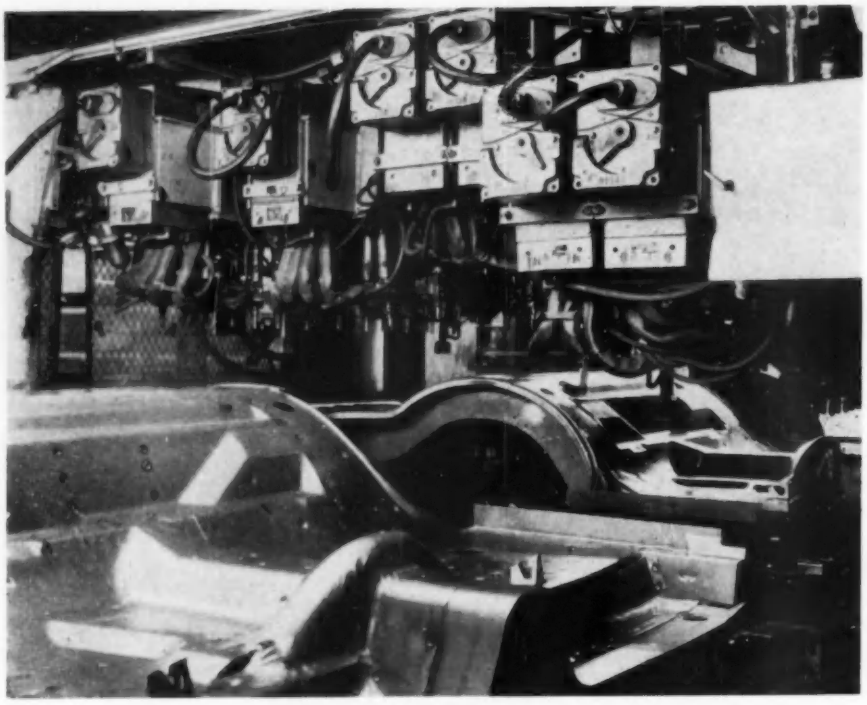
Electro-hydraulic servo system steers this seven-furrow implement frame transversely to follow the line of parallel but irregular crop rows.



This illustration shows one of the multiple welding units at Twinsburg

By

Hugh C. Quinn
Detroit Regional Editor

Expanded Uses for Welding at Chrysler Corporation Plants

Welding Methods Are Controlled by the Metals Joining Laboratory

WHEN Chrysler Corp. switched to its current system of unit body construction, welding assumed a new role. The all-welded body now must serve the functions of structural rigidity and stability once performed by the frame and side rails of the conventional body-and-frame automobile. And, as far as Chrysler is concerned, it must do a better job.

The number of weldments used in a Chrysler Corp. car indicates the importance attached by Chrysler to joining metals with heat. The current six-cylinder Plymouth with Powerflite transmission, for instance, has 7327 spotwelds and 532.5 in. of fusion welding. Add to this a sizeable amount of brazing and soldering. When the chassis frame was abandoned in favor of the unit body, Chrysler switched from arc to resistance welding and increased the KVA in key underbody areas to take advantage of the closer tolerance made possible by higher current.

Control over this intricate network of welds is in the hands of the Metals Joining Laboratory, which sets the standards and specifications for welding, brazing and soldering in all Chrysler plants. The laboratory works closely in the design of the product, in the adaptation of welding equipment and materials, and in the application of standards and specifications in the plant.

Organized in 1958, the Metals Joining Laboratory now has 10 engineers and a technician. At their disposal they have virtually every type of welding equipment used in the plants, plus new and experimental equipment that eventually might be put into use in manufacturing operations.

The prime function of the laboratory is administration of standards and specifications. This includes control of such factors as condition of the steel, fit-up of parts, clamping fixtures, and flange width and condition. The laboratory also specifies equipment performance, operator skill, welding machine set-up, and inspection procedures and techniques.

Because of this close control in manufacturing, the laboratory must start at the beginning, with product design. Laboratory personnel often work directly with a design group in setting up procedures. A new welded piece, although it might perform well, misses the target completely if it

cannot be manufactured practically and economically.

T. M. Hudson, supervisor of the Metals Joining Laboratory, cited the example of the new annulus gear being used in 1961 automatic transmissions. Here the laboratory worked with the transmission design group in developing a gear that would satisfy the requirements of both welding and function.

In some cases there are several joining procedures that could be used, and the laboratory is called in to help the design and manufacturing groups determine the most practical. It may be found, for instance, that a cast or forged assembly might be made better or more economically by welding, brazing or soldering.

When the component is beyond the design stage, the laboratory still keeps close tabs. It will work with a vendor in revising and adapting a piece of equipment to meet the new requirements. Or manufacturing will call on it to help set up for production of the new welded component.

A good example is the underbody of the 1961 Chrysler Corp. cars, produced at the Twinsburg, O., stamping plant. In this case, the laboratory worked with the vendor in revising the design of an arc spot gun that uses CO_2 gas and a consumable electrode. A burn-through welding process is used to join light and heavy gauge underbody components by welding from one side only.

Chrysler's mass production requirements called for a change in gun speed. Similar arc spot guns had been used in ship building, according to Hudson, where a rate of only 50 welds an hour is called for. But at Twinsburg, line speed requires a rate of 800 welds an hour per gun. The plant turns out up to 2000 floor pans in an eight-hour shift; each pan and rail assembly requires more than 860 spot welds.

At Twinsburg, 24 electrical welding units are fired automatically in millisecond intervals so that no two fire simultaneously. The 24 machines demand a total of 90,000 kva, or 45 million watts. There are 80 welding operations ranging in size from 100 kva machines to 2400 kva.

The Metals Joining Laboratory worked with Twinsburg personnel during the entire period of set-up and shake-down of the new welding equipment. Its engineers now are available at all times for in-plant trouble shooting. And after the plant had been set up, the laboratory conducted a training program for welding personnel, instructing operators in the use of equipment and general welding techniques.

The laboratory makes periodic checks of welded assemblies pulled in from manufacturing plants. All welded, soldered and brazed joints are checked, first visually for number and placement, then by disassembly or sectioning for strength and quality.

Like any other experimental group, the Metals Joining Laboratory is working far ahead of production, on both regular production items and research and development of equipment and techniques that may never see the inside of a plant. Chrysler's laboratory, Hudson revealed, is now working on ideas for 1963 automobile models.

But down the road is a welding control system that Chrysler hopes to be able to put into use for "building more quality into the welds," as Hudson explained it. The project is a feed-back mechanism that would guarantee proper current strength for every weld by maintaining a 70 per cent phase shift. Such a control, if perfected, would be an added inspection tool in manufacturing.

Another laboratory project is an evaluation of ultrasonic inspection of welds with an instrument now used by the Stamping Div. for rapid electronic scanning of sheet steel rolls for flaws. The laboratory has been running a statistical check with the device (made by Sperry Products, Inc.). Engineers made comparative checks of some 3000 spots of predetermined strength to establish a pattern of accuracy.

A third research project involves "spike welding," which Hudson described as a unique method of resistance welding that uses a series capacitor in the primary circuit of the transformer to achieve an extremely high secondary current for short periods of time. Secondary currents exceed 100,000 amp, while the welding time is only three or four cycles. The term "spike welding" comes from the shape of the secondary current trace.

Hudson said it is too early to know the restrictions of this tech-

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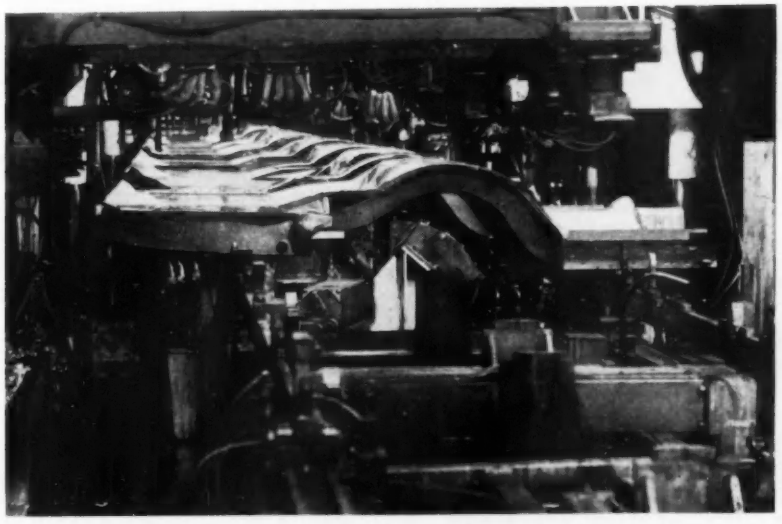


Perspective view of part of the welding setup at Twinsburg

British Plans for Rear-Jet Transports Revealed at

FARNBOROUGH AIR SHOW

By David Scott
BRITISH CORRESPONDENT

MAIN features of the Farnborough Air Show in early September were the major consolidation of the British aircraft industry, and the disclosures of forward projects—not displays of new aircraft or engines. Now overshadowed by America and Russia, Britain is pooling its brains and capital in an effort to stage a comeback in the field of jet transport, and to cash in on its lead in jet-lift and air-riding vehicles.

Recent mergers have reduced the surfeit of independent companies, resulting in 19 manufacturers working together in three major groups. Formed in May of this year, the new British Aircraft Corp. comprises Vickers-Armstrongs, English Electric, Hunting, and the fixed-wing aircraft and missile interests of Bristol.

The Hawker Siddeley Group has been extended to include Folland, de Havilland and Blackburn, with Handley Page on the brink of joining. Westland, concentrating on holicopters, has bought out all the main rotary-wing firms including Fairey, Saunders-Roe (aviation interests) and Bristol (helicopter interests).

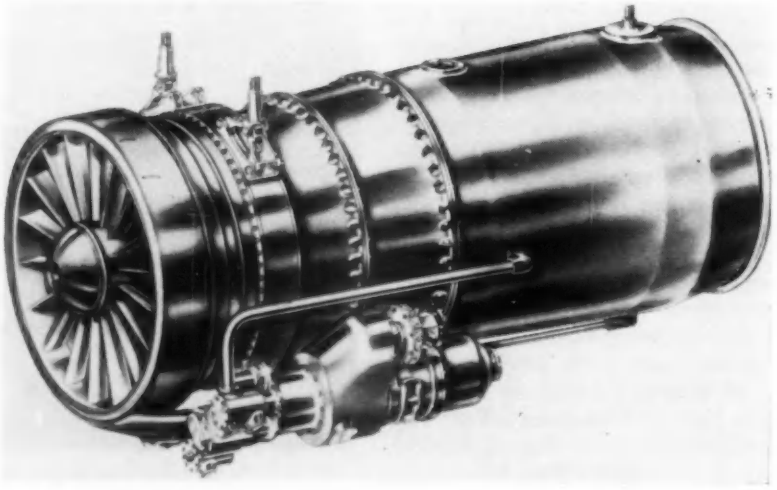
The BAC is preparing a family of rear-engined jet transports, the smallest being the BAC-107, a project started by Hunting three years ago. Designed as a Viscount replacement, it seats 59 tourist class, cruises at 500 mph, has a range of some 800 miles, is powered by a pair of 7350-lb-thrust BS.75s, and should be ready for service by late 1964.

The long-range Vickers VC.10 with four tail-mounted Rolls-Royce Conways is scheduled for delivery to BOAC in 1963. While this is designed to seat 150, the Super VC.10 will carry up to 212 passengers, added capacity obtained by a 28-ft extension to the fuselage, with tip tanks providing a non-stop trans-Atlantic range. BOAC will take over the first of these in early 1965.

Another project is the VC.11, a medium-range four-engined machine classed between the BAC-107 and VC.10 and using Rolls-Royce RB.163s.

BAC's Bristol 188 high supersonic research craft is now nearing completion. Of welded stainless steel construction, it is intended to investigate the intense heating problems at flight speeds above 1500 mph when airframe temperatures exceed 250C. Engines are two de Havilland Gyron Junior reheated turbojets centered in the thin wing. Maiden test flight is expected in the near future.

Also advancing the rear-engine configuration, the Hawker Siddeley Group will be offering the twin-jet Avro 771 as its bid to replace the Viscount. Information released at Farnborough indicated that this 60-passenger airliner is designed to cruise at 570 mph over stage lengths to 500 miles, using BS.75 turbofans. Overall length is



Bristol Siddeley BS.75 ducted fan engine produces 7350 lb thrust for a 1485-lb dry weight.

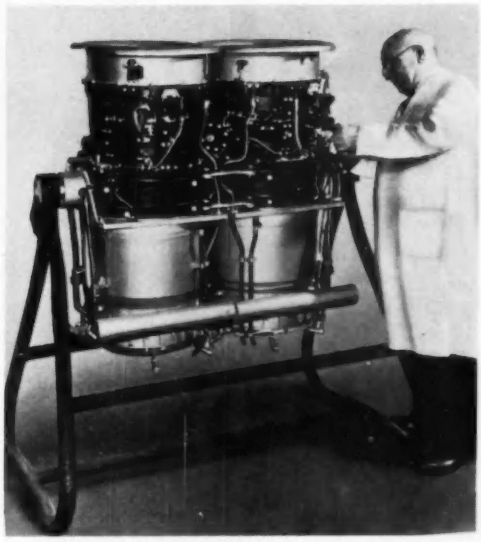
80.37 ft, span 77.46 ft, and maximum all-up weight 52,000 lb.

While this is still on the drawing board, Hawker Siddeley has scheduled the larger de Havilland DH.121 Trident for first flights in December 1961 and delivery in mid-1963. Three Rolls-Royce RB.163 by-pass jets are carried at the tail, giving the 80/100-passenger transport a 600-mph cruising speed for stages of some 1200 miles, using runways under 6000 ft. BEA has contracted for 24 of these aircraft.

On the military side, the Group is actively developing the P.1127 VTOL support fighter. Power plant is a single BS.53 turbofan whose four swiveling nozzles provide both lift and propulsion of some 14,500 lb thrust.

Hovercraft are the main forward project of Westland, with the SR.N2 as the most advanced undertaking. Now being built by Saunders-Roe, this 25-ton machine will carry up to 66 passengers or equivalent cargo or vehicles, cruising at 70 knots with two lift fans and two airscrews driven by four Blackburn A.129 815-hp shaft turbines.

Vickers-Armstrongs are known to be planning two comparable air-riding vehicles, a small high-speed launch with a 5/6-ton capacity, and a large machine taking 250 passengers or 25 tons of freight. Folland in the Hawker Siddeley Group is likewise probing this field with a projected series of Hovertrucks, the first with a 5-ton payload.



Rolls-Royce RB.108 for lift-jet operations develops over 8 lb of thrust for every pound of weight. Five of these engines power the Short SC.1 VTOL research craft which was demonstrated at Farnborough.

In addition, William Denny, Scottish shipbuilders, intend to build a special marine-type Hovercraft featuring partially submerged sidewalls to contain the air cushion on two sides, thereby reducing power requirements for a given lift.

These four companies are associated with Hovercraft Development, a subsidiary of the government-sponsored National Research Development Corp.

As a purely private venture, Britten-Norman have already produced a prototype of their BN-1 Cushioncraft which uses a peripheral rotor to support the 19-ft-diameter one-ton machine.

Outside the "big three" of the British industry, Short Bros. & Harland disclosed details of their SC.7 Skyvan, due to fly in June 1961. Described as the flying equivalent of a 1½-ton truck, it is a short-range utility transport with a boxy fuselage, powered by a pair of Continental GTS 10-520 six-cylinder units. While this engine will initially be obtained from America, it may later be made under license by Rolls-Royce. Basic airframe structure is a thin outer skin internally bonded by Redux to thin corrugated sheet.

Short is also working on the SC.5 Britannic, one of the world's largest freighters. Scheduled to fly in 1962 and for delivery to the RAF Transport Command in 1964, it carries an 85,000-lb payload over 1,150

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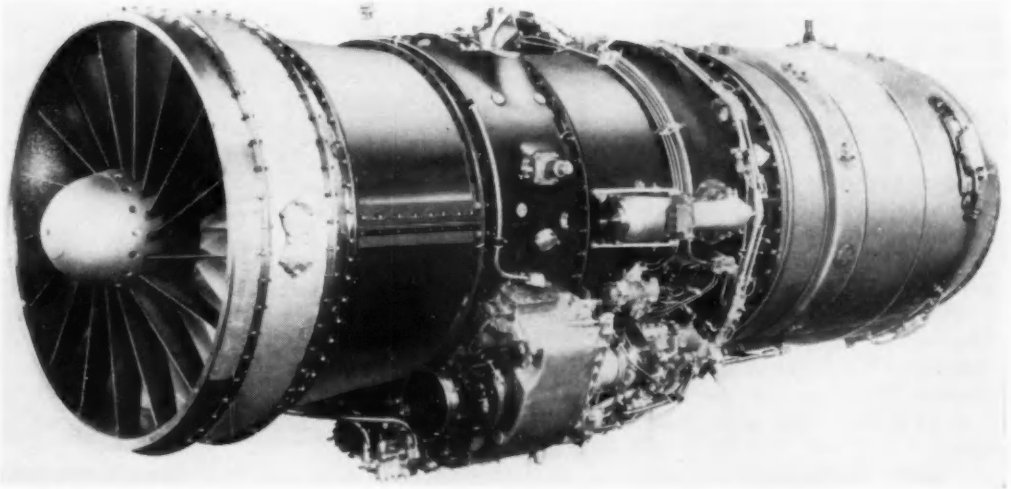


Rolls-Royce RB.141 by-pass turbojet, rated at 15,000 lb thrust, will power later versons of the Caravelle, the first becoming available in 1962.

Comfort Criteria FOR SEAT DESIGN

Dreyfuss-Designed Armchair Provides Universal Yardstick for Passenger Comfort

New mobile armchair for Lockheed's JetStar transport was designed by Henry Dreyfuss after five years of medical research and human engineering

By Norman M. Lloyd
MARKETS EDITOR

CERTAIN compromises are inevitable in the design of an automotive seat simply because it *is* an automotive chair, suited to all kinds and dimensions of people. It must fit a limited space, be light in weight, have easy maintenance, exhibit good resistance to wear and mechanical abuse, and provide maximum safety in the event of an accident. These conditions and many more have tended to nibble away at the standards of ideal comfort.

The job of the designer and engineer is to devise the most comfortable seat within the framework of these conditions.

For the aircraft designer, the problem is somewhat compounded since the passenger seat must meet stiffer stress requirements, provide a number of body positions, and incorporate such extras as head rests, arm rests and more hardware.

Designer Henry Dreyfuss, contracted to develop a mobile armchair for Lockheed's JetStar, conducted one of the most detailed research programs ever accomplished for the transportation industry. On the basis of exhaustive medical and human engineering studies, Mr. Dreyfuss has assembled a basic list of human requirements which provides a universal yardstick of good seating design.

Design criteria was based on both long and short-term considerations.

Initially, the seat should convey the desired effect of comfort and softness together with the sensation of sinking down rather than "bottoming." Surface material should be smooth and warm to the touch with cold hardware not readily accessible.

Body dimensions determined by anthropometric data should not serve as the sole criteria for seated comfort. For periods of prolonged sitting, the body continuously "shifts" to adjust circulation, relieve pressure and relax muscles. This "position sense" is one of the most important factors that too often has been neglected or minimized in seat design.

COMFORT REQUIREMENTS OF THE RECLINING SEAT

1—Variations in Body Size

Although the traveler often complains that the seat is uncomfortable, he is quick to lose sight of the fact that the chair is the best workable compromise of the body dimensions of people with widely varying statures.

The Dreyfuss study, the sum of five years of statistical analysis and research, considered the dimensions and physical requirements of a reported 95 per cent

of the men and women who would be most likely to use a mass-produced vehicle (from the tallest, 97.5 percentile, to the shortest, 2.5 percentile).

Weight ranged from 70 to 309 lb with a median of 152.8 lb (dressed with topcoat); 95 per cent weighed 207 lb or less.

Hip breadth was from 12.0 to 21.3 in., with a median of 15.0 in.; 95 per cent of the men had a measurement no greater than 17.4 in.; for women, it was no greater than 17.3 in.

Shoulder breadth, with a median for both sexes of 16.9 in., ranged from 12.7 to 22.4 in.; in 95 per cent it was 18.8 in. or less.

2—Changes in Position

The JetStar seat is a plastic shell with five individually molded cushions on the chair's seat, back, arms and a separate section that supports the head. The back cushion is precisely contoured to the lumbar curve of the spine. This feature also supports the flank region when the passenger turns on his side. The design allows a great variety of relaxing positions and also swivels and slides back-and-forth on tracks.

While the popular "bucket seat" allows one comfortable position, it severely limits the number of other positions.

SPECIAL FEATURES—DREYFUSS PRELIMINARY SEAT

Seat Bottom

- a semi-rigid sandwich fiberglass platform sandwiched between a firm foam cushion on top and a thicker, softer foam cushion underneath
- platform stops 3 in. from front edge of seat bottom
- seat is 16¼ in. to floor at front of free cushion
- seat length is 18 in.
- seat width is 20 in.
- seat pitch is 7 deg. when empty

Seat Back

- contoured vertically with maximum convexity at approximately 10 in. above depressed seat cushion
- contoured horizontally to fit rounding of the lumbar region
- flat in the upper part to open chest and straighten shoulders
- upper portion angled forward 15 deg with gradual bend centering at 16 in. above depressed seat cushion
- net slope in full recline approximately 53 deg when seat back is set at a 38 deg incline (chord line)
- high seat back is 30 in.
- no contouring at neck level
- "butterfly" pillow to stabilize head

Arm Rest

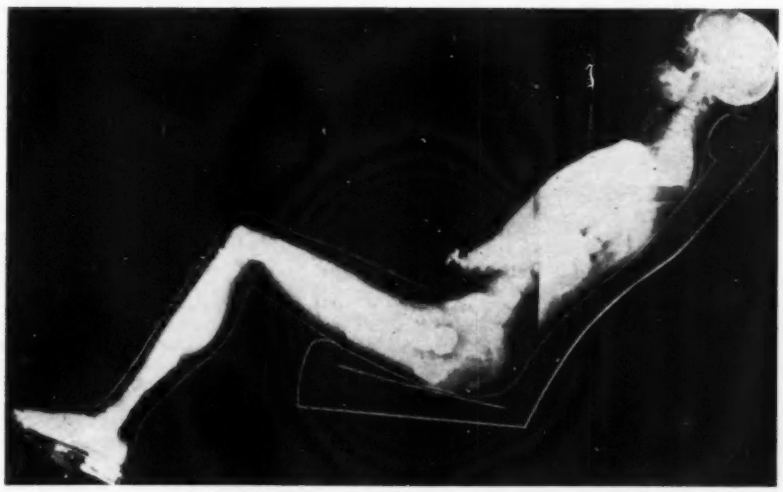
- 4 in. wide and 18 in. apart (inside dimensions)

Foot Rest

- elliptical

3—Body Weight Rests

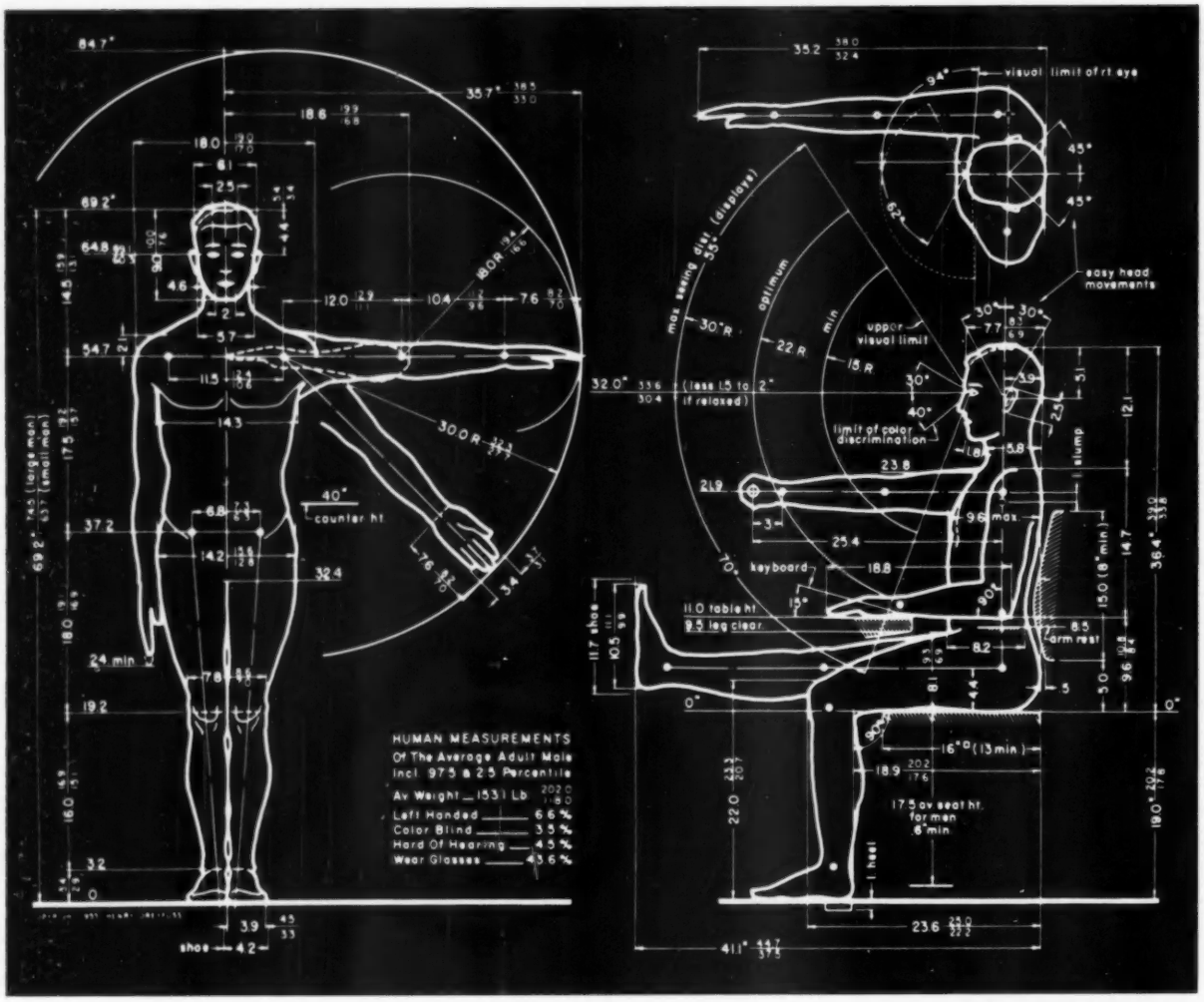
When seated, the body rests on two projections of the pelvic bone (ischial tuberosities) that are padded somewhat like the ball of the foot. These areas of support are rich in arterial blood, and are subject to a minimum of discomfort. Following nature's lead, the Dreyfuss seat cushion is flat and firm. This is counter to both the bucket seat and the big spongy armchair which roll the thighs inward, distributing the weight over other areas sensitive to strain and muscular tension.



X-ray study of average sized man in mock-up seat set in full recline

4—Lumbar Support

A well designed chair supports the muscles in the lower back, relieving them of the job of holding up the trunk. The backs of the Dreyfuss seat contain a specially designed pad that is actually curved slightly forward in the lumbar area. The philosophy that a compressible cushion will accommodate itself to the shape of the individual means little more than under the conditions of low



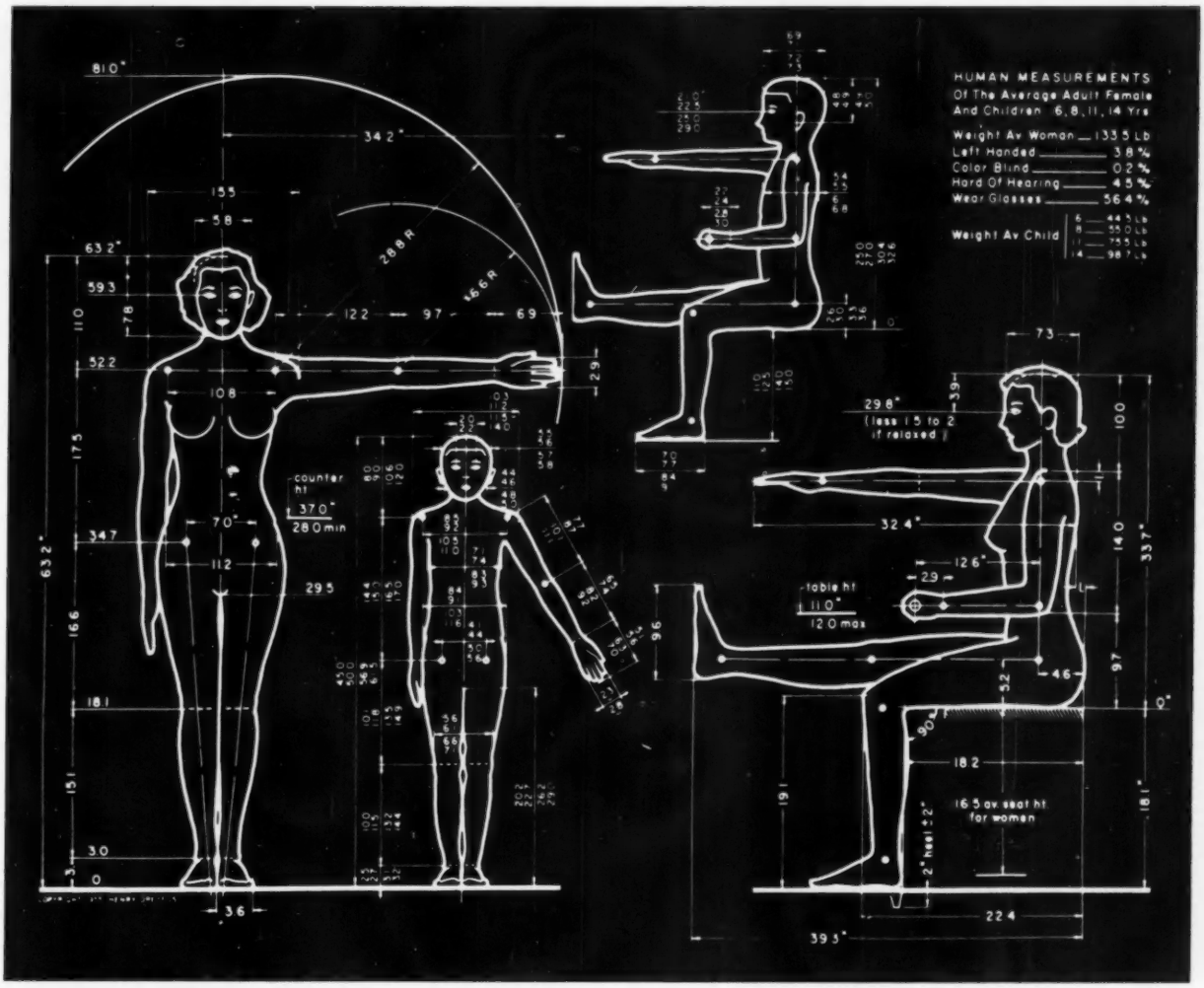
MEASUREMENTS OF THE AVERAGE-

pressure distribution, the muscles must work to maintain the posture of the back or the spine sags when the muscles become fatigued. The JetStar armchair is specifically designed to give both support to the region of the lower back, preserve the natural curve of the spine, and yet not restrict freedom of movement.

5—Support for the Upper Back

Here again, the seat avoids the plight of the scoop-backed chair which rolls the shoulders inward, hollowing the chest. The upper part of the seat back, at shoulder blade level, is flat in the horizontal plane allowing the shoulders to set back, opening the chest. In the vertical plane, a forward bend in the seat back (about 16 in. above the depressed seat cushion) provides a recess for the backward convexity of the thoracic or middle area of the spine. The increased slope places more of the weight of the upper body on the seat back, checking the tendency to ride down in the seat. Lumbar contouring also serves as a brake against sliding.

This chair on wheels was built into the final mock-up dimensions, and an average size man and woman were each rolled past an X-ray ma-

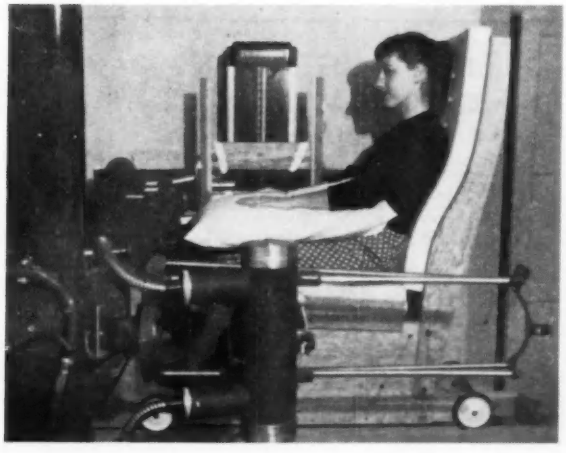

HUMAN MEASUREMENTS
Of The Average Adult Female
And Children 6, 8, 11, 14 Yrs
Weight Av Woman — 133.5 Lb
Left Handed — 3.8%
Color Blind — 0.2%
Hard Of Hearing — 4.5%
Wear Glasses — 56.4%
Weight Av Child
6 — 44.5 Lb
8 — 55.0 Lb
11 — 73.5 Lb
14 — 98.7 Lb
counter ht 37.0" 28.0 min
table ht 11.0" 12.0 max
29.8" (less 1.5 to 2 if relaxed)
16.5 av seat ht for women
2" heel
288 R
156 R

SIZE AMERICAN ADULT AND CHILD

6—Head and Neck Support

Contouring the seat back to fit the nape of the neck is not practical since there is no one correct contour height for all individuals. Additionally, wings on the outboard side of the seat beyond the width of the shoulder are too wide to effectively limit or support the lateral motion of the head.

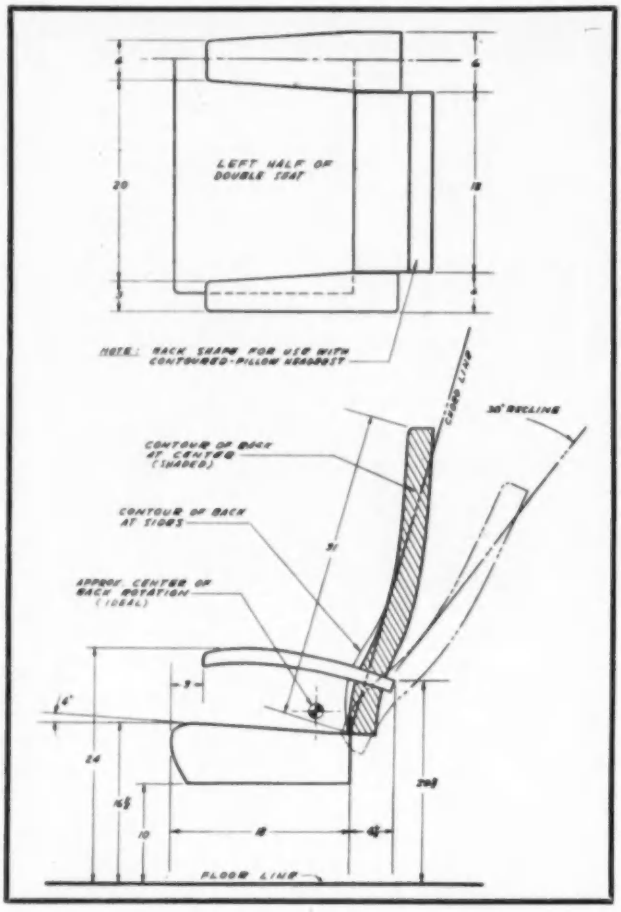
Dreyfuss has carefully designed a unit that cradles the head. To stabilize lateral motion and provide support for both the neck and the head, Mr. Dreyfuss suggests a resilient butterfly-shaped pillow with a small central section for the nape of the neck and with wings on the sides. This concept can more effectively supply support than contouring the seat back..



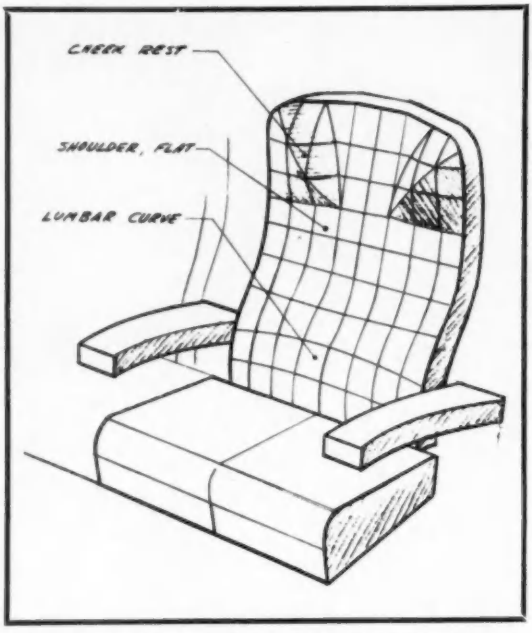
chine. By rolling the chair horizontally and moving the screen vertically, a series of head - to - toe pictures was assembled.

7—Underthigh Compression

Excessive pressure on the underside of the thigh normally results when (1) the seat height at the front is too great, (2) the seat bottom is too soft in the center relative to the front edge, and (3) the seat bottom is pitched backward without elevating the feet or low-


LEFT HALF OF DOUBLE SEAT
CONTOUR OF BACK AT CENTER (SHADED)
CONTOUR OF BACK AT SIDES
APPROX CENTER OF BACK ROTATION (IDEAL)
30° RECLINE
FLOOR LINE

Basic dimensions for standard two-abreast luxury seats



Schematic showing back contours with head area formed for use without "butterfly" pillow

ering the seat height at the front.

According to Mr. Dreyfuss' observations, large numbers of people agree that a seat height of 17 in. is too high for comfort. The shorter the length of the seat bottom, the less likely the too high or too steeply pitched bottom will cause underthigh pressure. The current tendency is to make this seat dimension too long (20 to 21 in.).

To eliminate this condition, the JetStar seat cushion is curved downward at the leading edge and does not come too far forward along the lower thigh (18 in.).

8—Arm Rest

Unless they are placed where the elbows can support some of the upper body weight, the arm rest is of little value. On the JetStar, the arm rest on the seats extend far enough rearward to support the tip of the elbow in all recline positions, and far enough forward to support the hand, including the base of the fingers. The height of the arm rest was carefully studied and corresponds closely with the elbow height (distance from the under surface of the bent elbow to the compressed seat bottom).

If the arm rest is fixed in relation to the seat bottom, it should be sloped back at an angle of 8 to 10 deg for inclines of the back rest of 12 to 38 deg. The inside distance between arm rests at the rear should be approximately 18 in. The underside of the arm rest should be cut back or curved to accommodate the hips and thighs between the seat cushion and under surface of the rest. A minimum of 6 in. clearance to the depressed seat is needed for the large person.

9—Sufficient Slope

The newly designed chair reclines, on a pedestal, through an arc of 24 deg and is proportioned to guarantee optimum angles at hips and knees. ■

I-H Introduces 55,000 Lb Model

Introduction of a compact-design International Harvester Co. truck-tractor model rated up to 55,000 lb gross combination weight and equipped with a 197-hp V-8 engine has been announced.

L. W. Pierson, sales manager for the Motor Truck Div., said bumper-to-back-of-cab dimension of the four-wheeler is 89¾ in. Wheelbase lengths available are 137, 149 and 167 in. An oversize five-speed transmission is standard as is a two-speed 23,000-lb rear axle.

AMA Officers Named

Rowland Burnstan, president, Borg-Warner International Corp., has been elected vice president, International Management Div., of the American Management Association.

At the same time, Robert G. Allen, president, Bucyrus-Erie Co., was elected a director for a three-year term.

The newly-styled Rambler American

styling changes, exterior dimensions have been reduced although interior room remains about the same.

The 100 in. wheelbase Rambler American is 5.2 in. shorter and 3 in. narrower than last year's model. Actual length is 173.1 in. The reductions in dimensions were made possible by reducing the front and rear overhang, and by slimming down the side panels. At the same time, usable trunk space has been increased 50 per cent to 23.8 cu ft.

American Motors Corporation's New Cars for 1961

THE Rambler American line for 1961, which includes two-door and four-door station wagons and sedans, represents the first basic styling change in the line for 11 years. Along with the

The Rambler Classic

1961 Rambler Ambassador

A standard equipment feature for 1961 is the ceramic armored exhaust system. The ceramic coating is bonded to the metal by firing at 1500 F. This exhaust system is used on the other cars in the new lines of the American Motors Corp.

Two engines and three transmissions with standard axle ratios are available. High performance axle ratios are optional at no extra cost.

The 125 hp, overhead valve Six is standard on all Customs and optional on Super and Deluxe models. Standard on Super and Deluxe models is the L-head Six which develops 90 hp.

Power brakes are a new option for 1961. Power steering is again offered as an option. The new convertible features an electric-hydraulic powered top.

Basic styling characteristics of the 1961 Rambler Six and V8 models are practically unchanged. However, the grille, front fenders, hood, and bumpers have been redesigned. Head lamps have been lowered and incorporated into the aluminum grille.

Eight four-door models are included in the classic Six line and six in the classic V8 line. They include sedans, two-seat station wagons and the three-seat station wagons introduced last year.

A new vacuum-powered four-door locking system is offered as a factory-installed option. This feature provides positive locking of all doors, controlled by the driver with a switch located on the instrument panel and an automatic master switch under the driver seat. Redesigned front shock absorbers incorporate a rebound hydraulic cut-off system for less tendency to "bottom" from severe bumps.

The Ambassador V8, built on 117 in. wheelbase, is available in six four-door models including a Super and Custom sedan, Super and Custom two-seat station wagon, and Super and Custom and three-seat station wagon. The vacuum powered 4-door locking system available on the Rambler

(*Turn to page* 86, *please*)

1961 Ford F600 Truck

Ford Expands Truck Line to 619 Models

In 1961, Ford will have 46 series of commercial vehicles with 619 models—twice as many as only four years ago.

The complete model line-up of 1961 Ford trucks includes the new "H" series Diesel or gasoline powered tilt cab tractors, and the Econoline, Falcon commercial and P-100 parcel delivery vehicles.

In addition to improvements in all standard six and eight cylinder engines, Ford's truck line will have a new optional 170 cu. in. six-cylinder engine for the Falcon series, a new 262 cu. in. six available early in 1961 for the medium lines, and five Cummins Diesels for the new Diesel line.

Light and medium duty conventional vehicles, plus the F-700 and bus series, share the same styling.

The new "H" series tilt units present new styling, while standard tilt cab models in the "C" series maintain much the same appearance as before.

Cabs are new for all conventional and tandem truck models. Light, medium and some heavy models are two inches wider, four inches lower and have lower step-in heights at no sacrifice in ground clearance. The dog-leg front post is eliminated, glass area is increased, ventilation is improved, and seating is more comfortable with either standard or individual seats optional on some models.

New triangular three-point cab mounts are featured for all conventional heavy and extra heavy truck cabs. Light and medium duty cabs have new four-point mounts.

Ford trucks continue to offer the I-beam solid front axle and longitudinal leaf spring front suspension. Front springs on the F-100 and F-250 series are shot-peened for increased durability.

On the one to two-and-a-half ton F-350 to F-700 trucks, both front and rear springs are lengthened and widened.

Rear springs in a wide range of capacities on the heavy and extra heavy F-750 through F-1100 series are longer and wider radius leaf type. Auxiliary rear springs are longer and wider.

In all light and medium models except the tilt cab "C" series, frames are changed, featuring new cross members and a drop in the cab area to reduce overall and step-in height. Tensile strength in the frame material has been increased from 36,000 psi in light and medium duty trucks all the way to the 80,000 psi high tensile steel in the frames of heavy trucks and tractors, some of which have double channel frames. Rear frame overhang has been increased in some straight truck models to provide better special body support, and frame widths continue standard to allow easy transfer of special bodies.

Changes in engines for 1961 trucks include oil bath air cleaners as standard equipment, improved crankcase ventilation, quieter engine fans with less power drag, and positive crankcase ventilation standard on Super Duty V-8's, the new 262 six, Econoline and parcel delivery engines, and optional on all other engines. A 180-deg thermostat is standard on 223 six and 292 V-8 engines. The latter also has new connecting rods while the 223 six has new front and rear oil seals.

The new 262 cu. in. six cylinder engine is designed for medium duty service, and will be available in the F-600, C-550, C-600 and B-600 series. It has a bore of 3.719 in., stroke of 4.03 in. and compression ratio of 8 to 1. With a single-barrel carburetor it develops a gross bhp of 152 to 4000 rpm, gross torque of 238 lb ft at 1400 to 1800 rpm.

Light duty F-100 and F-250 conventional Styleside pickup models have a new type integral cab and body which eliminates the separation between the cab and box.

Engines available for light duty

trucks are the 223 six and the 292 cu. in. V-8. Maximum GVW's range from 5000 to 9800 lbs.

Medium trucks in the F-500 and F-600 series feature wheelbases two inches longer, new cabs and sheet metal, new frames, an 11½ inch optional heavy duty clutch. The new 262 six will be standard in the tilt cab C-550 and C-600 series and optional in the F and B-600 series. A 5000-lb front axle becomes standard on the F and B-600.

"C" series tilt cab models offer printed electrical circuits, parallel action wipers, optional individual seats and power steering. Sleeper cabs are optional in the heavier models. Except for single headlights, tilt cab design remains unchanged.

The F-B-500, 600 and C-550, 600 trucks have GVW ratings from 11,000 to 21,000 lb, and GCW ratings up to 32,000 lb. Front axle ratings from 4000 to 7000 lb, one and two speed Eaton and Timken rear axles with capacities from 11,000 to 16,000 lb, and four- and five-speed Warner and Clark transmissions are offered. Engine options include the new 262 six, the 223 six, the 292 V-8 and the 292 Heavy Duty V-8. Available wheelbases in the F-500 series are 132 and 156 inches; five options from 132 to 194 inches in the F-600; and four from 99 to 153 inches in both the C-550 and C-600.

New cabs and frames in the heavy and extra heavy duty series combine to reduce the bumper-to-back-of-cab (BBC) dimension to 102 in., allowing for longer trailers. All models also have set-forward front axles, with a bumper-to-axle measurement of 33½ in. on the F-700 and 28 in. on all the others. A new maximum 212-in. wheelbase is also offered.

While the F-700 shares the cab and sheet metal with the F-500 and F-600, the distinctively-styled, larger trucks in the F-750 up and T-700 up series have separately mounted front-end sheet metal and fenders, cab and radiators.

The 102-in. cab dimensions for the heavy trucks is accomplished by flattening the front end, removing excess grille work and tucking-in the bumpers. Automatic radiator shutters are standard with all the Super Duty V-8 engines in the extra heavy lines.

A variety of new engine, axle and transmission options increase the flexibility of the heavy and extra heavy trucks. The 302 cu. in. heavy duty V-8 replaces the 292 cu. in. Heavy Duty V-8 as the option in F-C-B 700 trucks, and as the standard engine in the T-700 series. The 332 cu. in. V-8 replaces the 302 as standard in the F-C-B 750 series, and the 477 cu. in. Super Duty V-8 becomes a new option in the F-C-850 series.

Standard front axle for the F-800 series is rated at 6000 lb, with 7000, 9000 and 11,000-lb axles optional. New single and two-speed Eaton and Timken rear axles are available, offering both greater selection and more durability.

Transmission options include the Clark 2621V five-speed for the F-C-750, 800 and B-750, a Spicer 6352B for use with the two-speed Timken axles; and auxiliary Spicers for the F-950 through 1100 series. An 11½ in. heavy duty clutch is optional with the 292 cu. in. engines, while 13-in., two-plate clutches remain standard with extra heavy lines.

Gross vehicle weights up to 51,000 lb and gross combination weights up to 75,000 lb continue to be available in the regular heavy and extra heavy lines. The new "H" series has ratings up to 76,800 lb GCW. ■

Ford Introduces New Line of "H" Series Tractors

WITH the introduction of its new line of "H" series, high-tilt-cab, over-the-road Diesel-powered tractors, Ford Motor Co. is positioned to blanket the requirements of a majority of truck operators in this country. The Diesel tractors are powered by a selection of five Cummins Diesel engines with ratings ranging from 180- to 220-hp. In addition, all models in the line also are available with Ford Super Duty V-8 gasoline engines providing a power range from 206 to 266 hp.

The line, comprised of eight series and 108 models, employs a

(*Turn to page* 83, *please*)

One of the HD series Diesel-powered Ford tractors

British Truck and Bus Advances Revealed at

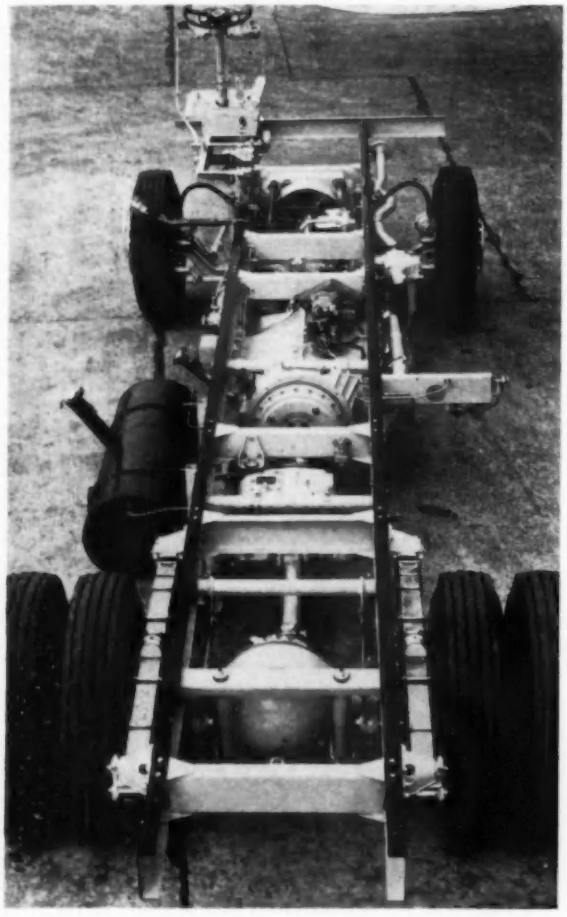
LONDON TRANSPORT SHOW

THE biennial Commercial Motor Show in London, staged at Earls Court at the end of September, reflected the rising fortunes of most British truck and bus manufacturers in contrast to the recession facing the passenger car sector of the industry. As the largest European producer and exporter of commercial vehicles, the U. K. pushed production up to an all-time high this year, with output running at an annual rate of some 430,000 units, a third of which go overseas.

By David Scott
BRITISH CORRESPONDENT

British models dominated the show with 27 makes on display, although one French and four German companies took part. Participation by a large number of body builders and trailer, component and accessory manufacturers brought the total of exhibitors to 422.

A.E.C. Regal VI underfloor-engined bus chassis is powered by a 168-hp Diesel with two-pedal Automonocontrol transmission.



Technical Trends

Main technical trends were forward-control or cab-over-engine designs emphasizing ease of driver access, the growing acceptance of articulated or semi-trailer heavy trucks, integral body-chassis construction, automatic transmissions, air suspension and disk brakes.

There is also a move towards more power and higher speeds, prompted by the advent of new motorways and turnpikes in England. Although the past two years have been a period of consolidation for the British industry, several manufacturers presented new or improved models.

A E C Chassis

A. E. C. introduced the Regal VI under-floor-engined chassis designed for single-deck bus bodies with up to 46 seats. The mid-mounted six-cylinder 690-cu in. Diesel develops 168 hp at a governed 2000 rpm, and drives through a fluid coupling and an automatic air-operated epicyclic transmission derived from Wilson patents.

Austin Truck

Austin unveiled a new half-ton-plus panel van, designated J.4, with a 160-cu ft forward-control body of integral construction with sliding or hinged front doors. The standard B. M. C. 42-hp engine is mounted at the rear of the cab so that only a shallow air duct interrupts the floor. A floor-mounted stick shift controls the four-speed gearbox. Independent suspension in front is by coil springs, while semi-elliptics are used at the rear. A sister model, differing only in the radiator grill, is marketed by Morris.

Bedford Trucks

The Bedford TK range of cab-before-engine trucks, made by G. M.'s Vauxhall, had its first public showing. These are produced with load ratings from 4 to

Cab of the Bedford TK can be removed in under 30 minutes for major overhauls. Wiring is disconnected at built-in multiple plugs, and the steering column detaches at the flexible joint.

12 tons, and feature easy access to the power plant through hinged side panels, and a flat-floor cab with low entrance step.

Daimler Bus Chassis

Daimler broke away from its traditional designs with the R. E. 30 Fleetline double-deck bus chassis that has a transversely-mounted engine at the rear of the frame. The 150-hp Gardner Diesel is in unit with Daimatic semi- or fully-automatic transmission adapted so that both input and output shafts are at the same end.

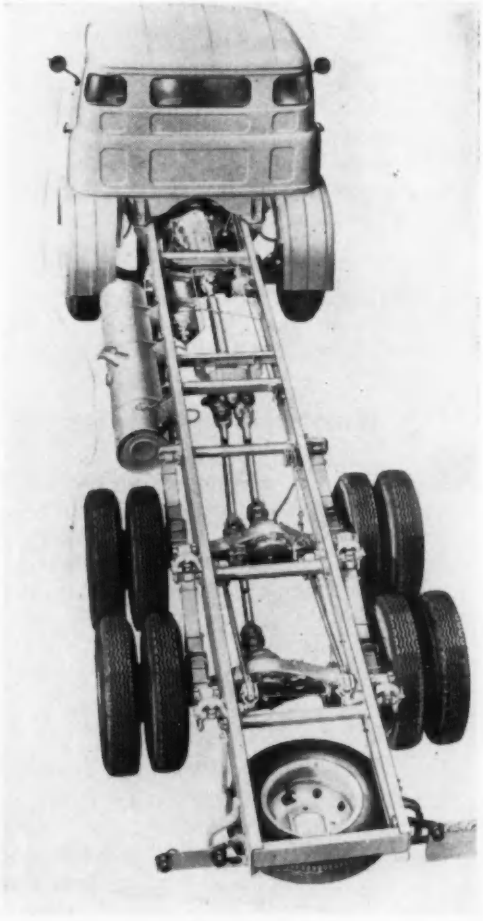
Drive is carried forward to the offset differential on the rear axle, which has an underslung center section coupled through straight spur gears to the wheel hubs. Use of a dropped-center axle avoids the need for a raised gangway. This is the first vehicle announced by Daimler since its take-over by Jaguar in May.

Dennis Truck Chassis

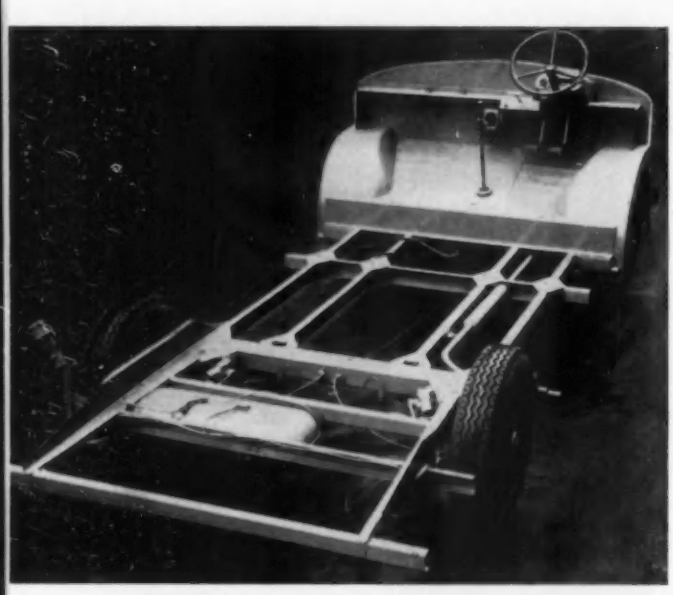
Dennis presented its new Vendor 1½-ton chassis which is unusual in having front drive and all-independent suspension. Front wheels are suspended by a single transverse leaf spring and driven through swinging half-shafts by a conventionally mounted four-cylinder Diesel (57 hp) or gas (56 hp) engine made by Standard Motor Co. The special three-speed transmission is combined with the spiral-bevel final drive and differential in a single unit.

Rear wheels are carried on individual trailing arms sprung by Metalastik rubber elements in compression between the box-section arms and the underside of the frame. This construction gives the Vendor a flat, unobstructed floor only 1 ft 7½ in. high, making it especially suitable for a delivery van. *(Continued)*

Below—Albion Reiver 10-ton chassis features the new 125-hp Leyland Diesel engine, independent propeller shafts to the two driven axles, and the non-reactive rear suspension employed by other companies in the Leyland group.



Thompson-Leyland 8-wheeled tanker has a welded aluminum integral body-chassis, rear-mounted engine, combined air and leaf springs in front, and a special optical system for rear vision.



Front-wheel drive and rear wheels suspended on rubber-sprung trailing arms give the Dennis Vendor chassis a flat floor only 1 ft 7½ in. off the ground.

Bus with Disk Brakes

Guy displayed the Wulfrunian, which is claimed to be the world's first bus chassis having air suspension and disk brakes on all wheels. Air springs are of the rolling-lobe diaphragm type with a Guy self-levelling system, and the Girling brakes have air-hydraulic assist. A forward-mounted 150-hp Gardner Diesel engine transmits torque to the offset final drive through a semi-automatic transmission placed at an angle between the main frame members near the center of the chassis.

Leyland Heavy Trucks

Leyland exhibited its new heavy-vehicle range comprising the 4-wheel Beaver, 6-wheel Hippo and 8-wheel Octopus, and the Lion 200-hp rear-engined bus chassis.

Scammel 10-wheel Tanker

Shown for the first time, the Scammell 10-wheel articulated tanker was notable for having an under-floor engine placed behind the cab at frame level. The six-speed gearbox is in unit with the engine and located ahead of it under the cab. Output is reversed through a simple 1:1 transposing box, and carried rearwards to the leading axle of the double-drive bogie on the tractor. The six-cylinder Gardner Diesel develops 150 hp at 1700 rpm. Bogie wheels on the 4000-gallon semi-trailer have independent pneumatic springing.

Standard Half-Ton Truck

Standard introduced the Atlas Major, a higher-powered version of its half-ton forward-control pick-up and delivery van. Its engine is the 102-cu in. four-cylinder unit from the company's Ensign sedan, delivering 50.5 hp at 4000 rpm. Gearbox and axle ratios are altered accordingly, so the vehicle now has a top speed of 62 mph.

Thornycraft Dump Truck

Highlight of a new 4x4 Thorneycroft dump truck displayed at Earls Court was a 5-speed constant-mesh gearbox combining the front-wheel drive shaft and pto in a single assembly, thereby eliminating the usual transfer box found on this class of vehicle.

The engine is a 150-hp Thorneycroft Diesel, and the gearbox is mounted as a separate unit, with drive to the forward axle engaged pneumatically. The transmission system comprises spiral-bevel axles and epicyclic secondary reduction gears in the wheel hubs.

Integral 8-wheeled Tanker

One of the most advanced vehicles at the show was an integral 8-wheeled tanker built by Thompson Bros. in conjunction with Leyland. Body and chassis are of light-weight unitary construction fabricated from argonarc welded aluminum, and a rear-mounted engine eliminates the conventional propellor shaft to give an overall height some 2 ft lower than a conventional tanker of similar capacity.

Designed and placed for easy access and replacement, the power plant is similar to that on the Leyland Lion bus chassis. The 200-hp Diesel is combined with a four-speed Pneumo-Cyclic gearbox driving the two-speed rear axle.

Four semi-elliptic springs at the rear, hung on brackets bolted to the underbody runners, are coupled in pairs by oscillating beams. Suspension of the two front steering axles is by leaf springs similarly attached to the runners, aided by 10-in. pneumatic bellows with automatic leveling. This arrangement is stated to overcome handling difficulties caused by the tail-heavy weight-distribution, and to suit both good and poor road surfaces. Brakes and steering are air-assisted.

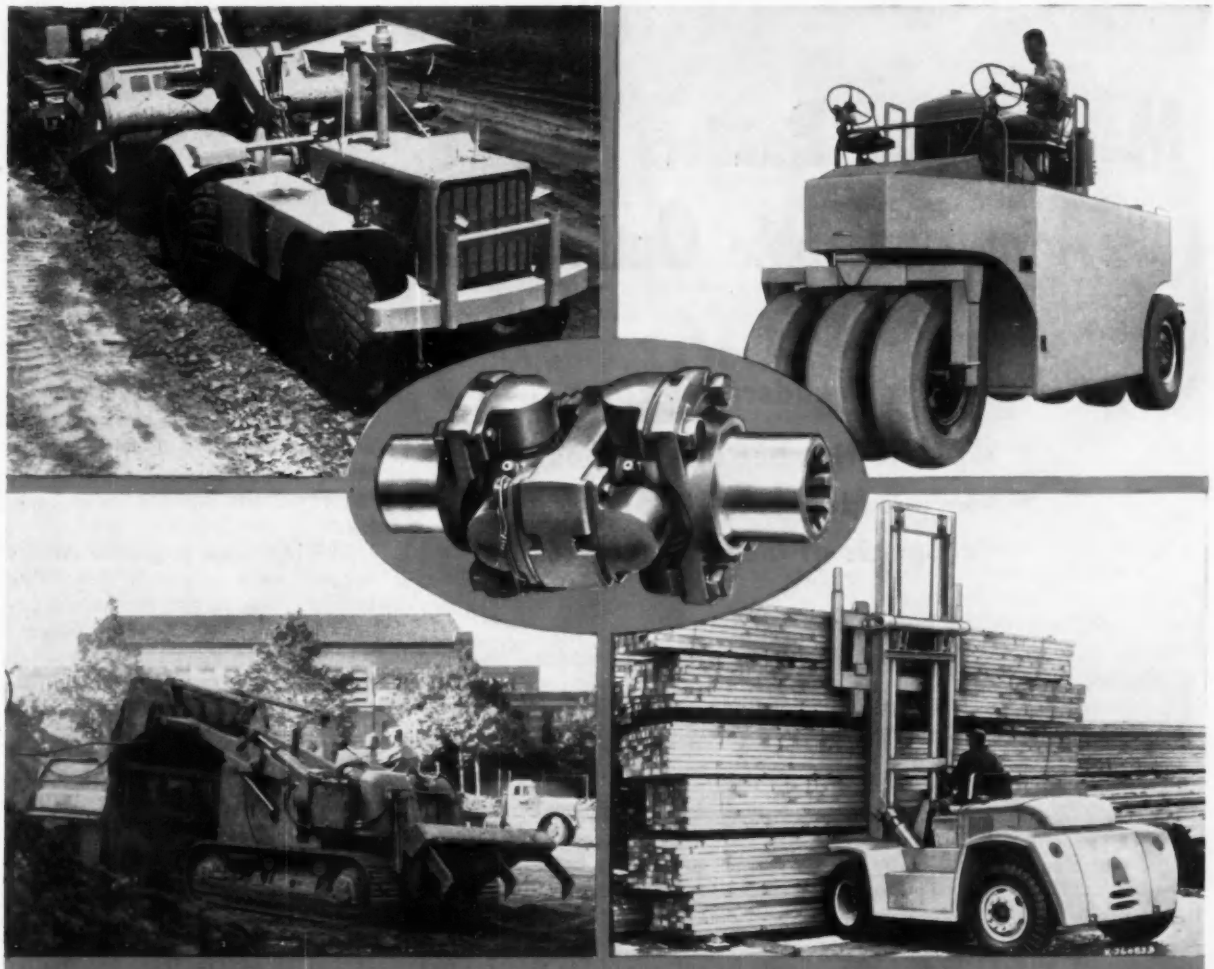
Resembling a coach without windows, the body features a full-forward cab reached through a single door in the center of the front panel. The two-piece windshield wraps around to flank the entire cab, providing an exceptional range of vision.

Conventional driving mirrors are supplemented by a Barr & Stroud rear-view optical unit comprising a 6-in. mirror in the cab and three special lenses spaced out in a duct along the top of the body beneath the catwalk. This gives rearward vision over a 40-degree angle and to within 8 ft of the vehicle at ground level.

The Autotanker, as it is named, has a capacity of 4000 gallons in six compartments, and a payload rating of 70 per cent of its 24-ton gross weight. ■

Goodrich's Canadian Plant

B. F. Goodrich Canada Ltd. has announced plans to build a multi-million dollar tire plant in Kitchener, Ont. Construction is expected to start in the spring and be completed in a year.



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Circle 109 on Inquiry Card for more data

Machine Tool Builders Report More Favorable Outlook

By Charles A. Weinert
EASTERN EDITOR

AI SURVEY of Builders Indicates—

- **Greater Number of Inquiries**
- **More Orders in Next Six Months**
- **Prospects of Increased Prices**

FOLLOWING closely on the heels of The Machine Exposition-1960 (Sept. 6-16), representative machine tool builders reported several significant industry developments:

As of October 1, order backlogs on the whole were substantially the same as those at April 1—despite the severe drop-off in July's orders. At April 1, as reported in AI's then-current survey compilation, order backlogs were about 8 per cent higher than at January 1, 1960.

(2) Inquiry activity at October 1 averages out at almost 20 per cent over April 1—attributed for the most part to the M-T Exposition. At April 1, inquiry activity was stated to be essentially the same as at January 1. In June it was reported to be almost 4 per cent *below* January 1.

(3) The outlook for business receipts during the next six months from October 1 indicates a rise of 10 per cent over the prior six months. In April of this year no change was predicted for the then coming six months versus the prior six months. In June, a slight decline was forecast for the second versus the first half 1960.

(4) Deliveries of equipment on orders placed in the first quarter '61, compared to those on current order placement, are not generally apt to be extended.

(5) Particularly significant is the fact that many builders are contemplating price rises effective with orders placed after January 1, 1961.

The foregoing are the major *overall-industry* impressions gained from consolidations of 35 special reports to AI from leading machine tool builders. These reports were sent in response to our latest periodic survey request. Results of similar surveys of the machine tool industry were presented this year in AI issues of January 1, April 1, and July 1.

More details pertaining to the present aspects mentioned above, together with information on other important aspects, are contained in the following:

ORDER BACKLOGS

Relative to the unfilled order volume on hand October 1 compared to the order backlog situation as of April 1, 1960:

Backlogs of "about the same" volume were listed by 8 companies.

Increased backlogs, ranging from 2 to as much as 154 per cent, were reported by 16 companies. The *average* for this group is +33 per cent—or +25 per cent with the top performer (154 per cent increase) not included.

Decreased backlogs, ranging from —2 to —80 per cent, applied to 11 companies—averaging out at —33 per cent.

Combined, the 35 reports actually show an "up" in order backlogs of +4.7 per cent over April 1, which in turn was about +8 per cent over January 1, 1960. However, with the top performer again not counted, there is just about a stand-off (no change) between the October 1 and April 1 order backlogs.

The individual comments on this subject were relatively few. One builder, with an increase of 15 per cent, commented "mostly foreign." Another, with an increase of 40 per cent, stated, "Due to recent price increase effective with September deadline." The president of the company with the increase of 154 per cent said, "Mostly defense orders."

AUTOMOTIVE ORDERS

"How much of your total orders on hand as of October 1 is represented by orders from automotive companies," was the second question.

Among the 34 specific replies, 29 companies reported proportions ranging from as little as 1 per cent, to as much as 90 per cent of total business on hand. The 29 replies average out at 28 per cent. Five companies indicated no automotive orders on hand as of October 1.

For comparison, at June 1 the companies with automotive business were likewise 29, with an average portion of 35 per cent. Six at that time reported no automotive orders in process.

INQUIRY ACTIVITY

As in the case of order backlogs, the relationship of inquiry activity at October 1 with that at April 1 was requested.

"About the same" activity was given by 9 companies.

Added activity, with a range of from +5 to +200 per cent, applied to 19 companies—averaging out at +39 per cent.

Decreased inquiry activity, from —10 to —25 per cent, was the reported situation for 5 companies. The group average in this instance is —19 per cent.

Overall, for the 33 companies reporting numerically, the average "up" is 19.5 per cent for October 1 versus April 1, 1960. At June 1, inquiry activity was computed to be —3.7 per cent from January 1; while at April 1 it worked out to be on the same level as at January 1, 1960. Therefore, apparently inquiry activity at October 1 was 19.5 per cent over both the January 1 and April 1 situations; and was some 24 per cent over that at June 1.

Comments from the builders with respect to inquiry activity at October 1 include:

"Has risen considerably since Tool Exposition."

Reported a rise of about 200 per cent "As a result of the Machine Tool Exposition."

"Some domestic activity" (included in rise of 25 per cent).

"Partially result of M-T Exposition" (up of 40 per cent).

"Machine tool show main cause" (up of 12 per cent).

BUSINESS OUTLOOK

Consolidation of the replies having to do with the outlook for new order receipts in the next six months versus the past six months, with a base date of October 1, gave these results:

The same level was predicted by 13 companies.

An upward trend, ranging individually from 5 to 50 per cent—with a group average of 22.5 per cent—was the combined forecast of 16 companies.

Reduced incoming business volumes of 10, 10, and 20 per cent were predicted by 3 companies.

Combined together, the 32 reports as a group predict more business receipts during the next six month to the extent of 10 per cent. This picture contrasts with that as of June 1 when a small decline (1 per cent) was forecast for the second half versus the first half of '60.

Comments from builders on the business outlook for the six months following October 1:

Howard A. Finch, manager of marketing, Jones & Lamson Machine Co.—(After predicting a 20 to 25 per cent rise), "If commitments made at Machine Tool Exposition materialize in orders."

Company Spokesman—(After predicting a continuation of order receipts at the prior six months' rate), "Note: We are having a good year."

Company Spokesman—(Accompanying a 5 per cent rise estimate), "Last six months included vacations plus economy slowdown. Next six months, economy expected to be up 3 to 4 per cent, with an additional 1 per cent in industry activity."

AUTOMOTIVE PROSPECTS

This phase of the questionnaire involved asking whether any sizable automotive business was in sight.

Among the group of 30 companies giving definite answers, 13 said "yes," and 17 companies said "no." At June 1 the response was 6 "yes" and 27 "no."

Builder comments on automotive prospects:

"There are several programs in the offing provided they are not shelved as in the past."

"Rumor has it that there are programs in the offing. To date we have not seen any material signs of them."

"Most of the business in the last two years has been from overseas. The (outlook) increase of 10 per cent comes from increased activity in the automotive field—which has been dormant."

"Hard to evaluate."

"Yes—foreign and domestic programs."

"Some increase in activity. Magnitude not yet available."

"A lot of (automotive) interest created at Exposition."

EQUIPMENT DELIVERIES

Those addressed were asked, "Do you anticipate the delivery time on orders placed during the first quarter '61 will run longer than that curently being quoted?"

The same delivery rate is foreseen by 21 of the reporting companies.

Longer deliveries—ranging anywhere from 3 to 13 weeks' added time, depending upon the individual builder and type of equipment involved—are predicted by 10 companies.

Shorter deliveries — to the extent of from 2 to 6 weeks—are anticipated by 3 of the builders.

Builder comments on probable delivery situation applying to first quarter '61 orders:

R. R. Baldenhofer, vice-president and general manager, The Thompson Grinder Co. — (Four weeks longer), "Based upon greater anticipated volume."

Company Spokesman — (No change), "Provided no sudden substantial increase in demand."

A. V. Bodine, president, Bodine Corp.—(Eight weeks longer), "Now quoting 24 to 28 weeks."

PRICES OF MACHINES

In an effort to pin-point the present situation on prices and price trends, the builders were queried, "Do you expect to increase the prices of your machine tools effective with orders placed after January 1, 1961—and if so, what is the percentage increase likely to be?"

The replies were evenly split—16 indicating "yes," and 16 reporting "no." However, it should be pointed out that at least 4 of the companies in the "no change" group recently boosted their prices. Two of these companies indicated increases of respectively 7 and 8 per cent effective in September.

For those contemplating price increases, most fall in the range between 5 and 10 per cent.

Builder comments on prospects of price increases:

"Our new machines already reflect some price increases. We will try to hold the line on machines not newly designed."

"Questionable at this time."

"Uncertain."

"Have just increased prices 8 per cent. Will actually apply to shipments in first quarter '61."

(*Turn to page* 78, *please*)

From Norton... Higher Speeds for Faster Grinding ...Cylindrical or Surface

For your cylindrical grinding

. . . Norton brings you cylindrical grinders which provide a new higher wheel speed of 8500 SFPM. In test after test Norton Machines using "high-speed" Norton wheels have proved their ability to operate at this new high speed — safely, steadily and with production advantages never obtained before.

These Norton cylindrical production grinders — now called the Series 8500, and so identified with a name plate — include the Type CTU Cylindricals, Angular Wheel-Slide grinders, No. 2 Centerless and the Type CP-1 PLUNG-O-MATIC®. Similarly, Norton high-speed wheels have been tested and approved for 8500 SFPM and carry the new checkered-flag stencil.

Remember: *it took a great deal more than stepping up spindle speeds to assure the greater productivity of Series 8500 machines.*

Fluctuations in wheel energy, mechanical energy, tangential force and many other factors had to be carefully considered before final approval of designs.

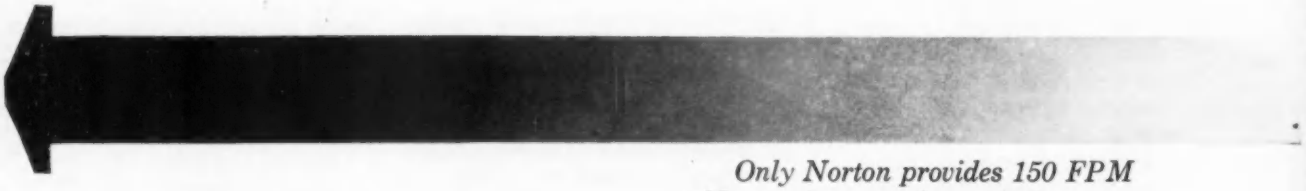
As a result, Series 8500 grinders produce more pieces-per-hour at lower cost-per-piece . . . provide finer finishes for improved product quality . . . and their higher speed reduces wheel dressings for longer wheel life and lowered wheel cost.

For your surface grinding

. . . Norton Type S-3 hydraulic surface grinders are now available with table speeds stepped up to a new high of 150 FPM.

This is another Norton achievement to bring you faster production than ever before. And, like the Series 8500, the Type S-3's are engineered to provide better production and product quality as a benefit of higher table speed.

Available in 6″ x 18″ and 8″ x 24″ sizes, Type S-3 surface grinders are fast and accurate on long production runs or toolroom grinding. They handle taller workpieces . . . are equipped for fast positioning, better sighting and loading . . . and their faster table speeds mean less heat damage to workpieces.



Only Norton provides 150 FPM table speeds on surface grinders.

Learn how Norton developments are bringing more and more advantages of the speed age to many types of grinding. And call your Norton Man — a trained Grinding Engineer — for details on how these advantages can be brought to your own production. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Massachusetts.

District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

NORTON
MACHINE TOOLS

75 years of... Making better products
...to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

Circle 121 on Inquiry Card for more data

News of the MACHINERY INDUSTRIES

New Abrasive Belt Line, Developed in a Cooperative Effort, Leads the Way to Producing Stainless Steel Strip with Uniform Thicknesses Within Tenths

By Charles A. Weinert

Three Teams Join in Developing Process for Making Ultra-Precision Stainless Strip

Stainless steel coil stock to extremely-close-tolerance thickness and finish is now available as the result of a "first" in the steel industry.

Largely responsible for the achievement is a new $300,000 abrasive belt grinding line. It represents a joint development over a period of eight years by engineers of Behr-Manning Co., The Hill Acme Co., and Wallingford Steel Co., Wallingford, Conn.—where the new equipment is now in operation.

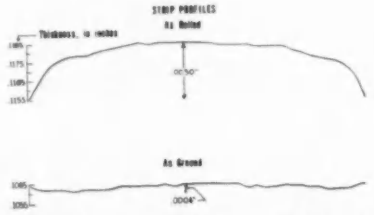
Thickness variations, across the width of stainless strip, of less than 0.0005 in. are being held because of the unique crown-grinding feature of the new machine. This equipment has made possible, for example, the production of 0.001 in. stainless steel strip for aircraft applications, having a thickness variation of only three per cent (0.00003 in.). At the same time, the new equipment on more conventional thicknesses has cut grinding costs 60 per cent, and increased output to almost three-fold.

The grinding line consists principally of two 60-hp vertical grinders running in tandem, each driving 30 by 126-in. resin-bonded cloth belts having either aluminum oxide or silicon carbide abrasives. Unlike earlier dry-grinding equipment at Wallingford, the belts are used in combination with a sulphur-chlorinated oil. Oil flow is ordinarily 65 gpm, but can be as high as 100 gpm per head. Although not customary, material removal rate in one pass can be as much as 0.020 in.

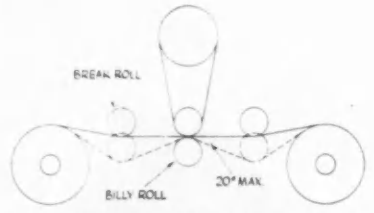
Several unusual features in the setup combine to flatten the strip as it approaches the abrasive belt. The coil is under an endwise tension of 30,000 lb, and is sharply bent at angles up to 20 deg by being forced under "break" rolls as it approaches and leaves the grinding point. In addition, a solid steel "billy roll" (work-support roll) eight inches in diameter forces the strip against the abrasive belt by hydraulic pressure. With these components the line can handle strip to 0.240 in. thickness, 27 in. wide.

The abrasive-belt contact rolls are either knurled steel or serrated rubber (of 45 to 90 durometer hardness), the former being used for tolerance grinding, and the latter for stock removal and final finishing. They operate at 900 or 1800 rpm, giving belt speeds of 2100 or 4200 sfm. Work is fed

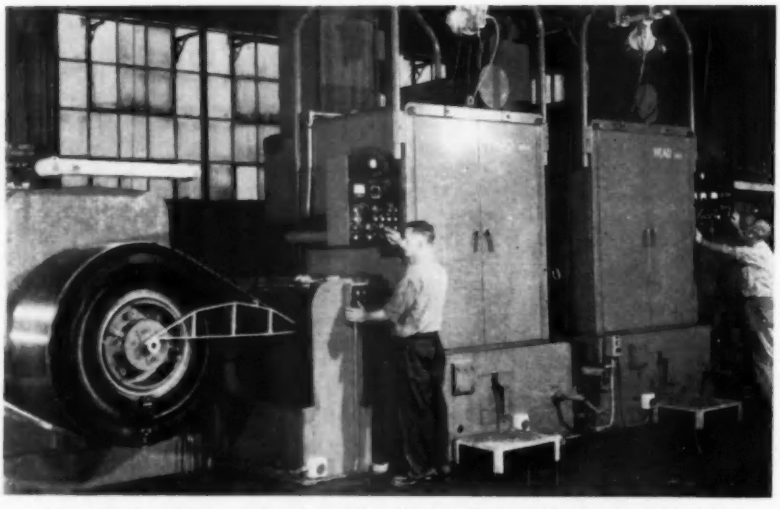
(*Turn to page 78, please*)



Comparison of thickness variation in ground stainless steel strip with that in the "as rolled" condition

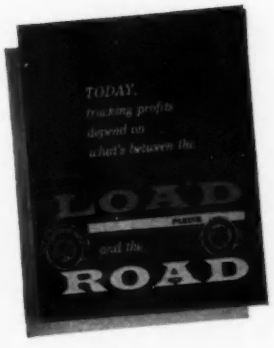


Schematic showing how the break rolls flatten the strip as it approaches and leaves grinding point, defeating its tendency (developed earlier in rolling) to curl or bow. The break rolls are positioned positively by manual screw-thread adjustment. The abrasive-belt contact roll is immediately above the billy roll.



Overall view of new abrasive belt grinding line at Wallingford Steel Co.

The One BIG FACTOR That Increases A Truck's Life!



For the complete story on Parish heat-treated alloy siderails, write for the interesting, illustrated booklet—"Load and the Road."

Commercial vehicles — from off-the-road loggers to transcontinental vans —are being designed to carry heavier loads farther at a faster pace. And the BIG FACTOR that means longer life for many of these vehicles is extra-strength Parish siderails.

Parish alloy steel siderails are *277% stronger* than ordinary carbon steel. Made of heat-treated chrome manganese molybdenum steel, they're the finest combination of modern materials and design know-how. They mean extra strength without extra weight.

Parish siderails absorb shock better, hold their shape better, than do conventional siderails. Misalignments caused by frame warping are almost non-existent. Drive train components last longer. Maintenance costs and downtime are reduced.

That's why some 30 leading truck and trailer manufacturers are now designing their vehicles around Parish heat-treated siderails—the *extra strength* siderails that stay aligned.

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Circle 138 on Inquiry Card for more data

New Valiant instrument housing is

molded of Du Pont DELRIN®
ACETAL RESIN

Weight reduction stands out among the objectives of designing a compact automobile—less weight means improved fuel economy and ease of handling. DELRIN acetal resin, newest of Du Pont's engineering materials, helps to cut the weight—but not the strength—of the 1961 Valiant instrument housing by approximately 80%.

Now on Chrysler Corporation's 1961 Valiants after extensive road and laboratory testing, the attractively styled instrument housings of DELRIN have proven their durability. The housing, made from die-cast zinc, would weigh nine pounds; in DELRIN, it weighs only two pounds. This reduction in weight not only pays off in decreased total weight for the Valiant but also eases handling problems on the assembly line.

DELRIN acetal resin offers strength and stiffness in thin sections even at the elevated temperatures to which the instrument panel often is exposed under a blazing sun. This corrosion-resistant material also exhibits excellent dimensional stability under varying conditions of humidity.

Molded-in bosses accept self-tapping studs to simplify mounting. Present assembly techniques are used when installing the housing. The decorative face piece—of Du Pont LUCITE® acrylic resin—is easily fastened to the housing with self-tapping screws.

* * *

Light weight, resistance to corrosion and high temperature, plus strength and stiffness, make DELRIN ideal for a variety of automotive uses. In addition, DELRIN offers ease of fabrication in intricate shapes, permitting cost savings in materials and manufacturing processes. To find out more about design improvements made possible by this versatile new engineering material, write to: E. I. du Pont de Nemours & Co. (Inc.), Department C-11, Room 2507D, Nemours Building, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

POLYCHEMICALS DEPARTMENT

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

METALS

A Slow Upturn in New Orders for Steel Has Increased the Operating Rate Slightly, But Outlook Is Not Encouraging

By William F. Boericke

October is normally a big production month for steel, but it didn't measure up to precedent. A slow upturn in new orders was perceptible that boosted the operating rate from the low 50's, but the improvement offered little to cheer over. Most major producers expect November to better October, but their sights are not set above 65 per cent of capacity. Some encouraging factors include improving sales of stainless and alloy steel, and an increase in rush orders demanding delivery within a week's time or even less. It seems a fair conclusion that some consumers are running out of steel items needed to maintain production.

The latest report of the Steel Committee of the National Association of Purchasing Agents was not exactly optimistic. It stated bluntly that the steel industry is in a slump. The present operating rate, it was added, apparently has little chance of gathering much momentum. There is no doubt that steel consumers have shifted the burden of warehousing and inventory to steel warehouses and mills.

Armco Is Optimistic

But at least one prominent steel executive takes a different view. The president of Armco Steel believes that the demand for steel has begun to rise and sees a gradual gain during the rest of 1960. He thinks that steel inventories in consumers hands have been substantially reduced, that construction activity will continue into early winter, and that the expected pick up in orders will carry the industry's operating rate up to 65 per cent. Armco has not reduced its budget or capital expenditures and expects to spend an even larger amount next year.

No Significant Upturn Yet in Evidence

Nevertheless the order books for most companies give little evidence of any significant upturn. *Iron Age* opines that when the upturn materializes it will be slow and may be less than seasonal. Yet it is pretty certain that steel is being consumed at a faster pace than the operating rate would indicate. Inventories undoubtedly have been substantially reduced although it has taken a far longer time to bring them down to a satisfactory level than was originally estimated. By mid-October market analysts placed inventories at about 12 million tons. This compares with 9 million tons at the end of last year's steel strike. The chances are that consumers won't be satisfied until they get them down to 10 or 11 million tons.

Price Hike Unlikely for Steel

The prospect of a price hike after December 1 when the steel workers get their scheduled take-home pay increase appears extremely unlikely unless the general economy shows a sudden and unexpected reversal of trend. Steel executives are more concerned with an increase in the operating rate than in a price increase. The big producers can do quite well at 60 per cent operating capacity while an increased base price, no matter how well justified, would invite further inroads of foreign steel on domestic markets.

While capital spending will be curtailed by the steel mills because of reduced earnings in 1960, this is regarded only as a postponement and does not reflect any doubt of future sales prospects. The Commerce Department and SEC, both of whom interview businessmen regularly on their capital spending plans, have lowered their original estimates for 1960, but they still predict the steel industry will spend more than in 1959.

Aluminum Operations Reduced

It is now grudgingly admitted that 1960 aluminum demand won't measure up to earlier estimates either at home or abroad. Production schedules have been scaled down accordingly and now have been set about 2 million tons annual rate. The purpose of reducing the operating rate is strictly to hold plant inventories in line. Based on average shipping volume for the first half of the year, inventories represent about a 40 day supply of metal. Indicative of the steps taken by the big producers to adjust plant inventory of primary aluminum was Kaiser's action in closing down a second potline which reduces its production to 70 per cent of capacity. Anaconda, however, is reported operating at 87 per cent and Alcoa at 86 per cent, although the industry as a whole won't show better than 83 per cent of capacity. Aluminium Ltd. has cut out one potline at its Quebec plant, blaming weakness in the North American market.

Industry's Optimism Unchanged

Commenting on the general situation, an Alcoa official declared that for the long pull the future never looked better, but the industry's growth is temporarily obscured by a present over supply in relation to current consumption, as well as by price cutting that has seriously affected earnings. The price situation, he added, was severely competitive. In consequence the fourth quarter outlook is clouded. In his opinion the price of aluminum is too low and justifies an increase, but until the general economy is improved this

is unlikely to be attempted. Currently the aluminum business is on a plateau and its long established up trend has been interrupted. Sales in the first half of 1960 were helped by consignments abroad to newly established foreign affiliates. It seems a little doubtful if these sales can be maintained at the same rate for the balance of the year.

A spokesman for Reynolds confirmed that shipments of primary metal to domestic fabricators are turning down about 15 per cent and inventories are increasing. But while the growth curve has temporarily leveled off there has been no loss of markets. Particularly important is the introduction of aluminum engine blocks in some of the new cars.

Copper Prices Cut

Early in October the smelters reduced their price for refined copper to 31 cents a pound, a 2-cent cut from the 33-cent price that had held unchanged for 9 months. This was not unexpected. London had been offering spot metal at the equivalent of 28 cents and obviously a 5-cent spread between London and New York was out of line. A 3-cent spread to cover tariff, freight, and handling is normal—some think it should be a little less.

Brass Business Still Depressed

Business for the brass mills was light in October. Price cutting continued, especially in copper water tubing, all blamed on foreign competition. But lower prices failed to attract buyers. Mill business is reported 10 to 15 per cent below 1959 levels on a tonnage basis and 25 per cent on a dollar basis. There has been almost universal discounting of official mill prices with strong competition for such business as is available.

Zinc Demand Holds Steady

The latest statistics made a better showing than was expected. It was no surprise that slab production would reflect the effect of strikes at New Jersey Zinc plants and at Bunker Hill. Domestic shipments were off, but exports were up. The net result was a reduction of 8000 tons in slab stocks at the end of September. There was satisfaction that while steel is moving at less than 55 per cent of capacity, galvanizing lines are at about 70 per cent with several new lines coming into operation. Thus the outlook for Prime Western has improved. Special High Grade continues to move well. The same cannot be said of purchases by brass mills which continue to sag.

Zinc and Lead Quotas Unchanged

Tariff Commission has found no reason to change current U. S. lead and zinc import quotas as set at 80 per cent of the 1953-7 average on a country-by-country basis. The Commission's report delays any new action on the controversial tariff until the new administration is in power when it is sure to be brought up again in congress. ■

Meet the AI By-Liners

A brief biographical sketch of the editors and contributors to AI whose by-lines appear regularly

Introducing Norman M. Lloyd

NORMAN LLOYD, Markets Editor, has brought to the AI editorial staff a business history of service to several industries, including his experience as Marketing Manager of AUTOMOTIVE INDUSTRIES and AIRCRAFT AND MISSILES. As a specialist in materials, methods, products and purchasing practices, he is uniquely qualified for the responsibility of editorially covering the automotive manufacturing market.

"Norm" graduated from Bates College in Lewiston, Me., and worked as an Industrial Engineer for such organizations as Clarostat Inc. and the New England Bell Telephone Co.

He joined Kellett Aircraft Corp. as an Engineering Test Pilot in 1953, and moved up to Chief Test Pilot, Project Engineer, Director of Military Contracts, and Assistant to the Vice President, Engineering.

His work relating to the development of mechanical stabilizing systems and the acceptance, for operational use by the Marine Corps in 1955, of the TU-111 auxiliary engine was recognized by the Office of Naval Research.

A veteran pilot with six years of military service in the Marines, he was recalled for a second "hitch" in 1950.

AIR BRIEFS

By R. RAYMOND KAY
PACIFIC COAST EDITOR

U. S. planemakers are worried that Russia will be first in the air with a 2000-mph transport. And that we might lose our lead as supplier of the world's airliners.

If the Russians are first, it will be a great blow to U. S. prestige—comparable to the first Sputnik.

This country should move fast to start developing a Mach 3 transport. First costs could run $1 billion. Some experts say it can be done for $250 million. But whatever the cost, planemakers can't afford such a huge investment. The government must lend a financial hand.

Explosive Forming Pays Off

Explosive forming certainly has paid off in cost savings and improved parts. Here's a good example. Rohr Aircraft has now made 20,000 sound suppressor tubes for the Boeing 707 with explosive forming equipment. The company says it made these parts at 25 per cent of the former cost.

Rohr says it's moving far beyond the explosive forming level into new approaches to high energy forming. Among the most promising of these is the spark discharge system. A high voltage discharge electrical spark gives the needed energy.

The Minuteman Program

The Minuteman ICBM program is going ahead at a fast pace. Under Air Force and Boeing direction work is underway on two phases: (1) Flight tests at Patrick Air Force Base, Florida; and (2) An assembly plant at Hill AFB, Utah. Minuteman is expected to be operational by mid-1962.

A speedup of missile sites is on the urgency list of the Dept. of Defense. By next June, some 20 Minuteman ICBM underground launch sites should be ready. Each site will be "hardened" to resist the effects of nuclear explosion.

It's a huge job. The Army Corps of Engineers will soon award contracts. The first two sites will cost $40 million.

Supersonic Transports

Air Force recently started a study program on a supersonic transport for military use. Eight airframe makers were invited to give their ideas: Boeing, Convair, Douglas, Lockheed, McDonnell, North American, Northrop, and Republic.

If Air Force goes ahead with the supersonic transport, several of these firms may team up, along with an engine maker, to do the job.

The world's scheduled airlines are not in a great hurry for the faster-than-sound transport. Right now they are only halfway through their jet re-equipment program. And that won't be completed until 1962.

"Whether we like it or not, the supersonic aircraft is a prospect we must face within the next decade." That's the opinion of Sir William P. Hildred, Director General of the International Air Transport Ass'n.

• • •

Brief Air Briefs . . . What's the Air Force thinking after the Atlas, Titan, and Minuteman? A high-ranking general favors a small mass produced missile, with extreme mobility. It might be truck mounted.

Maj. Gen. August Schomburg, head of the Army Ordnance Missile Command, believes that the Nike-Zeus is this country's only hope for a defense against the Russian ICBMs. And the general says this anti-missile missile is ready for production.

Hercules Powder Co., Wilmington, Del., will make the third-stage rocket engine for the Minuteman ICBM at Bucchus, Utah.

Boeing will propose to Air Force a supersonic twin-jet tactical fighter. The plane will fly faster than Mach 2. Several other aircraft makers are in competition for this business.

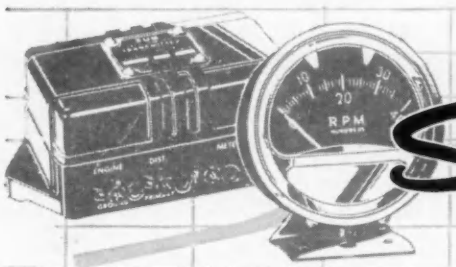
First Dynasoar experimental flights should be in 1963. ■

An aerospace company is using a high-powered electron beam gun to weld metals for spacecraft. It's a new technique. Company engineers say they're welding joints that withstand temperatures up to 3000F.

Allison Rocket Pact

Allison Div. of General Motors Corp. is one of four firms beginning joint study on a nuclear rocket propulsion system.

Studies by Thiokol Chemical Corp. as prime contractor in conjunction with Nuclear Development Corp., Linde Co. and the Allison Research Dept. are for future nuclear power concepts that would replace chemical combustion processes to provide thermal energy.



Sun TACH-O-GRAM

One in a series of technical discussions on Tachometers.

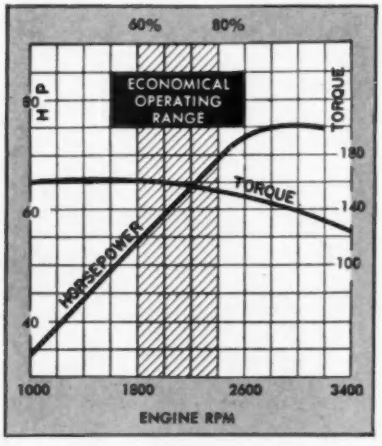
Vehicle Operators Agree Sun Electric Tachometers Help Reduce Engine Wear

Fleet owners, through the use of carefully kept comparison records, have proved that Sun Electric Tachometers make a big difference in reducing engine wear . . . and even gas and oil bills.

These records show that Sun Tachometer equipped vehicles actually had longer engine life, along with a pronounced reduction in overall maintenance costs. Here's why.

Economy Operating Range

Every engine has an economic operating range—60% to 80% of the speed at which it delivers its rated horsepower. Frequent engine operation above or below the economical operating range results in high fuel consumption, excessive strain, and premature wear on vital engine parts.



A Sun Electric Tachometer helps prevent this. It tells the driver when to shift gears to stay in the economy range. All he need do is keep the Tachometer Indicating Hand between the two white arrows. These arrows which are pre-set to mark the high and low points of the proper RPM range.

Critical RPM Zone Kept in View

Because this range is always in view, drivers avoid such hazards as "lugging" and "overspeeding." They're able to get maximum fuel miles per gallon. And on fleet maintenance record sheets, this care shows up as maximum trouble-free engine performance — reduced engine wear — lower service costs.

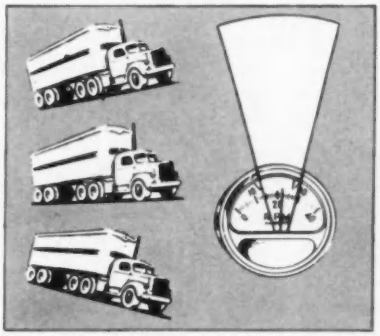


Diagram shows how on "up hill long pulls," "level cruising," or "down grade driving," Sun Tachometers show driver when to shift to keep engine in correct RPM range.

Electric Type Preferred

Based on field test reports, operators have found that the Sun Electric Tachometer gives smoother, steadier, more accurate readings—and is less subject to pointer waver. The electric type is not affected as much by bumps, holes or washboard roads.

Bump Proof Because of "Ruggedized Accuracy"

This preferred "Bump Proof" feature of Sun Electric Tachometers, is made possible through the use of a rugged D'Arsonval Movement, with Jewels mounted in silicone rubber.

This greatly reduces shock or vibrations, and is not found on any other type or make Tachometer.

This is a Sun manufacturing exclusive, and is called "Ruggedized Accuracy."

It affords longer Tachometer life and greater accuracy. Beryllium hair-springs minimize spring fatigue.

Adding to this tough, "Ruggedized" feature, is the use of Alnico magnets, for permanent strength — and double bridge construction.

Wide Applications

These features add up to proven big benefits for fleet operators—and also are the reasons why Sun Tachometers are in demand for Automotive, Marine and Stationary engines; both Gasoline and Diesel types.

Samples Available

Why not look deeper into the "inside story" of Sun Electric Tachometers. By doing so you may find that for your application the electric Sun Tach is the best answer.

Samples are available immediately for engineering tests, along with reference catalog bulletins and print specifications. Just fill in the coupon below for immediate action. Thank you.

AVAILABLE FOR ORIGINAL EQUIPMENT OR REPLACEMENT

Sun ruggedized ACCURACY ELECTRIC TACHOMETERS

Makers of Electric Tachometers for Automotive, Marine and Stationary Engines; both Gasoline and Diesel.

NEW

Sun Electric Corporation
Tachometer Division
6373 N. Avondale Avenue
Chicago 31, Illinois

New "Facts Folder" tells all about SUN Electric Tachometers.

☐ Send literature and installation instructions.

☐ Have your representative call with sample Tachometer. Specify:
(Gas.....or Diesel.....application)

Name.....

Title.....

Firm.....

City.....Zone.....State.....

875R

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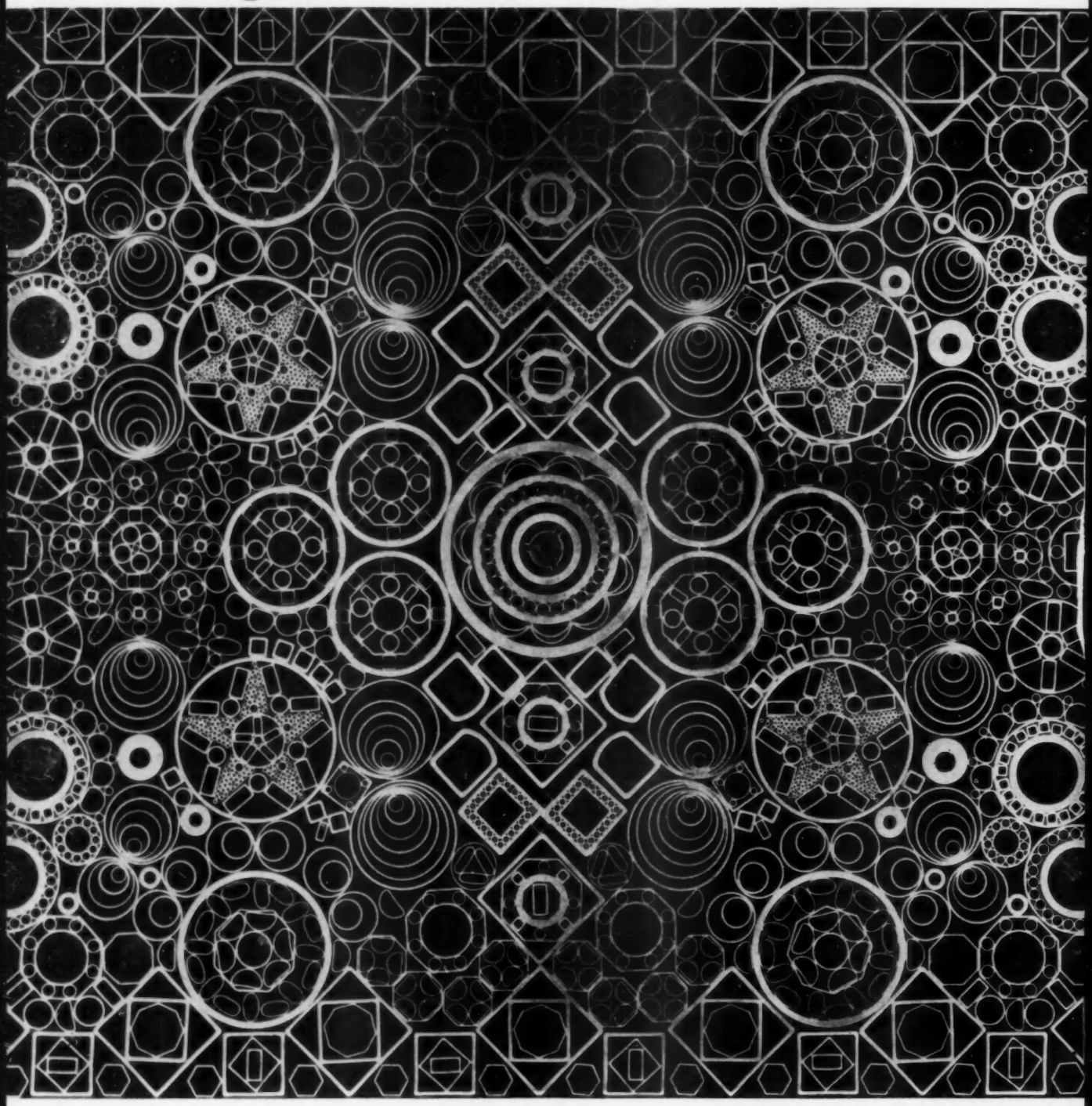
This mark tells you a product is made of modern, dependable Steel.



Seamless Steel Tubing comes in almost every shape and size, that is, if it's **USS National Seamless Mechanical Tubing.**

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MIDLAND

Research and Development at Work

Heat—the greatest enemy of the brake system—is being brought under control by advanced approaches to safety in Midland-Ross laboratories. Here research and development is forging a new safety link to protect automotive America.

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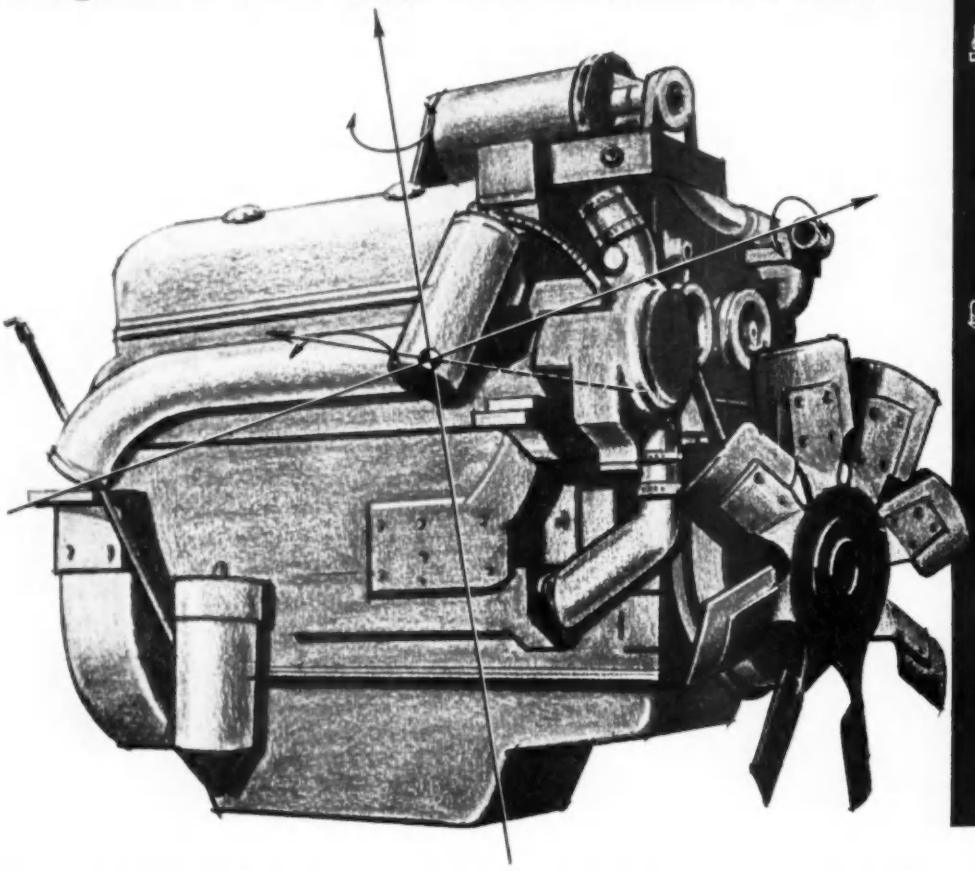
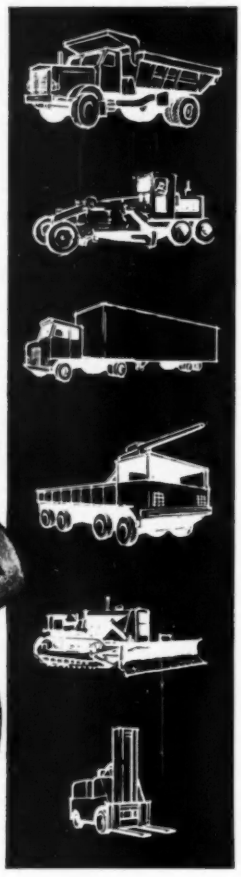




CONTROL ENGINE VIBRATION

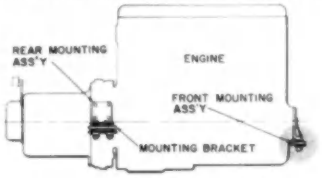
TWO GOOD ENGINE SUSPENSION DESIGNS

Efficient isolation of engine vibration provides an important competitive advantage to manufacturers of modern automotive equipment. LORD-engineered flexible suspensions do the job, assuring smooth, quiet, long-lasting performance that satisfies users.

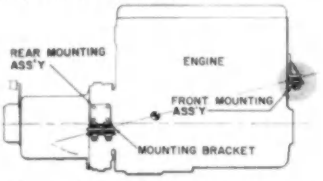
Cushioning the severe torsional firing impulses and unbalance forces of today's high compression, high horsepower engines gives these positive benefits: greater operator comfort . . . less structure-borne noise . . . protection of radiators and components from fatigue failures or malfunction . . . lower stresses on engine and structural members from frame and chassis twist.

LORD engine suspensions of proved design are expertly engineered to meet your requirements for performance and stability. Specially compounded elastomers afford high temperature and oil resistance.

LORD capabilities in vibration/shock/noise control for heavy automotive engines are unmatched. You can utilize them to obtain better performance, greater sales appeal for your engine or vehicle. Contact your nearest Lord Field Engineering Office or the Home Office, Erie, Pa.



Typical suspension for truck engine uses Lord compression-type elastomeric mountings to isolate disturbances and accommodate frame distortion. Center Bonded Mountings feature high unit load capacity and patented rebound protection.



Recommended arrangement for truck engine suspension is decoupled system with front mountings higher than rear. This results in maximum stability and smaller, lighter mountings.

FIELD ENGINEERING OFFICES

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AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By C. J. Kelly
ASSISTANT EDITOR

JOINT COOPERATION SOLVES ARMY PRODUCTION PROBLEMS

THE BENDIX Corporation, The Heald Machine Company and Mason & Hanger-Silas Mason Company, Incorporated, combined their "Know-How" in solving the production problems encountered by the U. S. Army's Pantex Ordnance plant. High accuracy template and contour part production requirements led to the joint development of an entirely new machine tool. This new unit was designed especially for use with numerical control.

The machine tool is a precision contour, boring and template grinding machine designed and built to the specifications of Mason & Hanger. Built by the Heald Machine Company, Worcester, Mass., the machine is controlled by a Bendix "Precision" 2-axis numerical control system.

This numerically controlled machine tool permits grinding or machining to a tolerance of plus or minus 0.0001 in. in routine production of templates and parts.

The table slide and cross slide unit of the Heald machine is mounted on a welded steel base which moves on precision steel ways. A single turning head is mounted on a bridge at one end of the machine base, and a vertical oscillating template fixture is mounted on a separate steel base. The turning tool and grinding head are installed on top of the cross slide unit. The slides are positioned by Bendix hydraulic servo motors which drive ball-nut lead screws as directed by the Bendix machine control unit.

The tools and grinding wheels of the machine are dressed to very precise roundness and are checked by a Sheffield optical gage. The machine is mounted on a reinforced concrete foundation four feet thick. Accurate control of the temperature is required to maintain the high accuracy of this numerically controlled machine. The machine is installed in a temperature controlled room and the system maintains a constant temperature of 75 deg F (within ¼ of one deg).

The numerical control system accurately controls the motions and feed of both the table slide and cross slide of the machine tool in increments of 0.000025 in.

The numerical control also controls auxiliary functions of the machine such as on and off operations for the turning and grinding spindles, cutting coolants, and tape rewind operations.

Decimal display position indicators with continuous readout of position location of each axis is another feature of this control system. The position indicator assists in the set-up operation and provides a flexible method of manually operating the machine.

PART PROGRAMMING OPERATIONS

Precision contour parts and templates on the numerically controlled machine are achieved by the close cooperation of several departments at Pantex. The tooling group of the Processing Engineering Department makes the process drawings and transcribes information for the required parts into numerical data. This information is then transferred to a process sheet for use by the Digital Computer group.

Punched cards are prepared from the information on the process sheet. The cards are verified and read into an IBM 650 computer. The computer interprets this data, calculates cutter center offset, vector feed rates, and requires spacking of intermediate points on curved sections in accordance with the arc tolerance specified. This information is punched on control cards by the computer. The cards are then fed into a card-to-tape converter to make the punched plastic control tape.

The control tape is mounted on the photoelectric reader in the Bendix machine control unit. This unit automatically reads the information from the punched tape and controls all the machine motions required to generate parts to the specified tolerance. ■

Auto Sales Expected To Remain Stable

The Federal Reserve Board says American families intend to buy autos, washing machines, refrigerators and television sets in the near future at about the same level as a year ago.

This conclusion was drawn from a sample survey of 17,000 households by the Census Bureau. The board plans to continue the survey of consumer buying intentions and make its results available to the public for anaylsis.

The accuracy of the survey is in question as the announced intentions of consumers are not always turned into actual purchases. It has been estimated that intentions to buy run about one-third to one-half over actual purchases.

• • INDUSTRY STATISTICS • •

By Marcus Ainsworth
STATISTICAL EDITOR

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	Weeks Ending		Year to Date	
	Oct. 15	Oct. 8	1960	1959
PASSENGER CAR PRODUCTION				
Total—American Motors Corp.	10,300	10,721	379,277	307,415
Chrysler	1,692	1,426	68,415	55,879
De Soto	238	190	17,941	38,234
Dodge	5,482	4,718	318,381	133,501
Imperial	602	485	12,655	16,460
Lancer	3,210	2,650	32,004	.....
Plymouth	5,061	4,539	204,890	332,561
Valiant	2,472	2,501	202,318	1,144
Total—Chrysler Corp.	18,757	16,509	856,604	575,779
Comet	6,322	7,185	154,866	29,153*
Falcon	9,204	10,455	407,066	20,539
Ford	24,610	26,231	781,254	1,178,921
Lincoln	174	131	13,499	21,297
Mercury	3,806	4,694	123,127	121,449
Total—Ford Motor Co.	44,116	48,696	1,479,812	1,371,359
Buick	6,215	5,384	205,325	193,972
Special	2,136	2,190	10,427	.....
Cadillac	3,532	3,077	122,371	120,621
Chevrolet	30,936	27,054	1,268,308	1,232,773
Corvair	5,919	5,091	192,849	40,010
Oldsmobile	8,008	7,713	289,107	320,793
F-85	2,574	2,587	12,757	.....
Pontiac	8,364	8,257	344,706	345,060
Tempest	1,022	523	1,598	.....
Total—General Motors Corp.	68,706	61,876	2,447,448	2,253,249
Total—Studebaker-Packard Corp.	2,583	2,552	86,344	122,343
Checker Motors	153	152	5,813	3,317
Total—Passenger Cars	144,615	140,506	5,255,298	4,633,462
TRUCK AND BUS PRODUCTION				
Chevrolet	7,401	7,891	316,155	291,246
G. M. C.	1,569	1,578	85,533	68,174
Diamond T	31	15	2,235	4,690
Divco	80	80	3,256	2,996
Dodge and Fargo	1,398	1,296	58,048	62,385
Ford	2,126	2,267	273,658	274,894
F. W. D.	0	4	741	851
International	2,296	2,423	101,844	117,513
Mack	277	277	12,119	14,079
Studebaker	150	149	10,496	10,425
White	226	247	13,152	15,961
Willys	2,215	2,088	104,127	93,381
Other Trucks	80	80	3,545	3,041
Total—Trucks	17,849	18,395	984,709	959,636
Buses	85	100	3,300	1,955
Total—Motor Vehicles	162,549	159,001	6,243,307	5,595,053

*—Edsel Production.

NEW FOREIGN CAR REGISTRATION *

AUGUST

1960		1959	
Volkswagen	12,022	Volkswagen	9,520
Renault	5,016	Renault	9,011
Opel	2,239	Fiat	3,822
Simca	2,033	Opel	3,712
Triumph	1,961	English Ford	3,606
Fiat	1,889	Simca	3,577
English Ford	1,836	Hillman	2,717
Austin Healey	1,602	Triumph	2,326
Volvo	1,347	Vauxhall	2,247
M. G.	1,198	M. G.	1,826
All Others	11,434	All Others	14,274
Total	42,577	Total	56,640

EIGHT MONTHS

1960		1959	
Volkswagen	101,567	Volkswagen	74,472
Renault	49,896	Renault	56,188
Opel	20,236	English Ford	29,707
English Ford	19,344	Opel	26,761
Fiat	16,018	Fiat	26,178
Triumph	12,971	Simca	25,725
Austin Healey	12,434	Hillman	20,137
Simca	11,850	Triumph	16,017
M. G.	10,057	Vauxhall	15,670
Mercedes Benz	9,633	Volvo	12,751
All Others	92,821	All Others	101,325
Total	356,827	Total	404,951

TRACTOR SHIPMENTS

WHEEL TYPE

Hp. Ratings	August	Eight Months
9-34 belt hp.	444	19,945
35-39 belt hp.	740	15,976
40-49 belt hp.	1,015	22,731
50-59 belt hp.	940	27,120
60 belt hp. and over	817	17,020
Total—Wheel Type	3,956[1]	102,792[2]

TRACKLAYING TYPE

25-59 net engine hp.	323	5,073
60-89 net engine hp.	323	2,879
90-129 net engine hp.	334	2,902
130 net engine hp. and over	610	6,208
Total	1,590[3]	17,062[4]

[1]—Valued at $8,801,000
[2]—Valued at $215,860,000
[3]—Valued at $20,311,000
[4]—Valued at $206,433,000

1960 NEW REGISTRATIONS *

Arranged in Descending Order According to the Eight Months, 1960 Totals

NEW CARS

Make	August 1960	July 1960	August 1959	Eight Months 1960	Eight Months 1959
Chevrolet	140,595	147,288	138,200	1,175,554	1,034,910
Ford	110,522	108,339	126,665	944,556	1,000,436
Plymouth	34,498	38,929	34,407	312,367	267,899
Rambler	37,482	39,291	33,237	296,005	246,839
Pontiac	30,654	32,950	34,494	271,515	272,190
Dodge	26,547	34,998	12,486	256,857	99,281
Oldsmobile	25,359	26,214	29,078	229,827	256,367
Buick	17,637	19,235	17,702	172,509	173,274
Mercury	9,622	11,050	12,691	102,574	103,263
Cadillac	11,135	10,759	10,603	98,382	98,282
Comet	17,706	14,245	.....	87,169	.....
Studebaker	8,426	8,837	10,416	76,276	91,462
Chrysler	5,629	6,073	5,192	52,791	43,210
De Soto	1,557	1,896	3,665	18,248	31,137
Lincoln	1,396	1,283	1,794	14,573	18,784
Imperial	1,039	1,133	1,194	10,463	11,660
Misc. Domestic	617	476	3,172	6,611	33,952
Foreign	42,577	43,537	56,640	356,827	404,951
Total—All Makes	525,400	546,535	533,636	4,483,104	4,187,899

NEW TRUCKS

Make	August 1960	July 1960	August 1959	Eight Months 1960	Eight Months 1959
Chevrolet	26,736	26,149	29,509	220,098	228,606
Ford	24,539	23,293	27,852	194,824	191,220
International	9,419	9,648	9,901	77,063	69,763
G. M. C.	7,745	7,565	6,976	56,411	48,889
Dodge	3,685	3,762	4,747	29,462	37,363
Willys Truck	1,456	1,426	1,675	12,432	11,873
White	1,095	1,474	1,260	10,563	10,265
Mack	936	966	981	7,881	9,306
Willys Jeep	921	799	885	6,699	5,909
Studebaker	600	629	541	3,616	4,336
Diamond T	248	216	265	1,887	1,876
Brockway	73	90	105	772	736
All Others	3,987	3,659	3,690	30,855	27,606
Total—All Makes	81,440	79,674	88,387	652,563	647,749]

* Compiled from official state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted w thout Polk permission.

Using basic components, seven different arrangements are possible, as shown above. Spindle drive motors can be mounted at right, left, or on both sides with single or double spindles; two machines can be placed side-by-side or used with other production machines.

The 4 BIG Features of Ex-Cell-O's New 411 Vertical Are Important To You

1. QUICK TOOL CHANGING—Tool changing and adjusting is fast and easy because of "clean" design and placement of the Model 411's components.

2. EASY PARTS HANDLING—Vertical construction lends itself to safe, easy loading and unloading of parts in a wide variety of shapes and sizes.

3. SINGLE COLUMN CONSTRUCTION—Solid base-column gives firm support to the hydraulically-operated compound tool slide. Rugged, simple construction assures maximum accuracy and efficiency, plus long life with lowest maintenance.

4. PRODUCTION VERSATILITY-The all-new Model 411 performs turning, boring, facing, grooving, limited contouring and chamfering operations singly or in combination. Often, both sides of disc-type parts can be machined simultaneously.

Contact your Ex-Cell-O Representative or write direct for details.

60-68

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Machinery Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

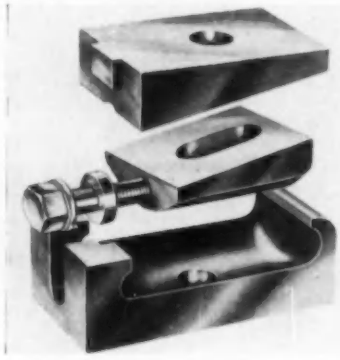
NEW PRODUCTION and PLANT EQUIPMENT

By C. J. Kelly
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Leveling Jacks

ADJUSTABLE leveling jacks have been developed in a new series with capacities to 20,000 lbs, for precise



level installation of machine tools, automation lines and other tool room and production equipment. The series is designated Empco style J-H leveling jacks. Of unusually compact design, the new units permit up to ¼ in. vertical adjustment and feature two inter-acting inclined planes which give smooth upward to downward control without lateral movement. The vertical motion of the top plate, according to company engineers, eliminates shifting or imbalance caused by vibration or lateral stress on machine legs or tie-downs. Designed for use at corners, centers, or along entire machine base, the new levelers are installed wherever equipment needs support. Anchor bolts, where required, pass through the entire jack assembly. Other standard features include a convenient hex head adjusting screw and a self-compensating concave base which counteracts uneveness of floor. Vibration absorbing mounting pads are offered as optional equipment. *Enterprise Machine - Parts Corporation.*

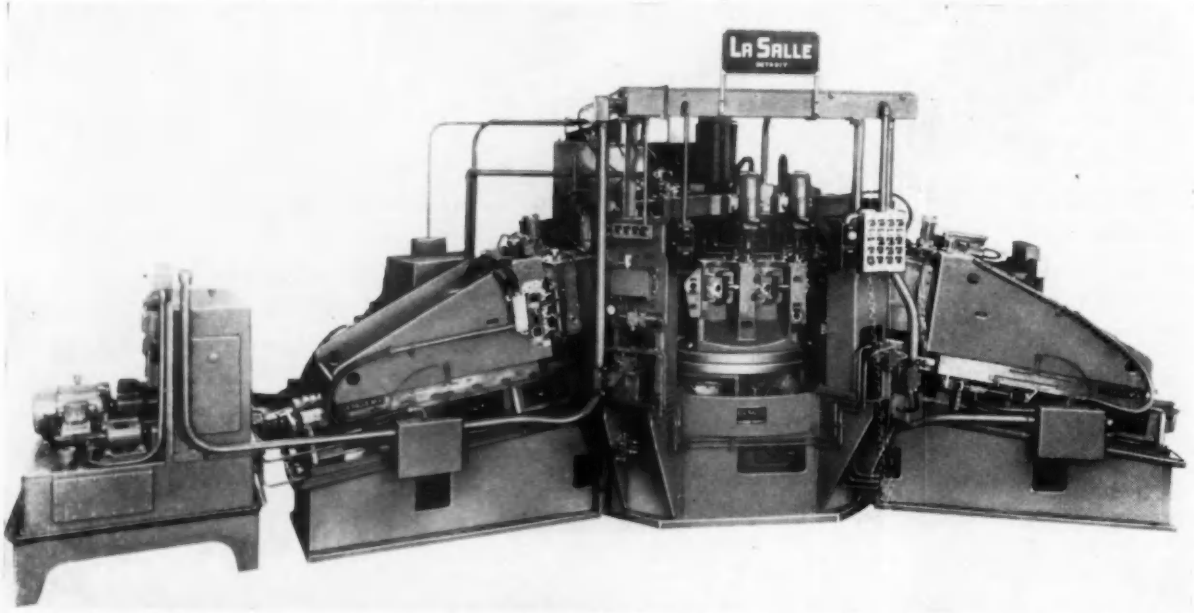
Circle 41 on postcard for more data

Recess Tool Holders

DESIGNED for tape-controlled or automatic machines which normally have confined areas for tool changes and/or storage, new recess tool holders feature a working section shortened approximately 40 pct without sacrificing any of the range, according to the manufacturer. Two sizes are now being introduced in this series. The 1-RA has a working range from ⅛ to 1 in. diam and a travel of 9/32 in. The 2-RA has a working range of 1 to 2 in. diam and 5/16 travel inches. The feed-out of the cutter is in ratio of 1 to 1 to the spindle, thereby eliminating any mathematical calculations or interpolations for set-up or cutter design. These new RA recess tool holders can use circular form cutters—high speed steel or carbide—or bit-type cutters. *Maxwell Industries, Inc.*

Circle 42 on postcard for more data

Automation Engineers Design Machine Tool from Standardized "Building Blocks"



Eight standardized basic components form the nucleus of these "Building Block" machine tools;—main base, wing base, wing base adapter (dial type), way-type feed unit, quill-type feed unit, horizontal angular adapter, angular column and vertical column. The standardization applies to the mounting and attaching surfaces of these components, the bolting patterns, the bolt sizes, the location method, and the uniform work loading height of these machine tools. LaSalle Machine Tool, Inc.

Circle 43 on postcard for more data

Flash Welding Equipment

A FLASH welding machine designed to automatically produce quality welds in high carbon wire of ¼, 9/32, ⅜, and 9/16 in. diam has a timed, forced control mechanism for synchronizing flashing and upset and an automatically controlled system for normalizing the weld area.

According to the manufacturer, the resulting joint has drawing characteristics equivalent to or better than the parent wire, and welding time is appreciably lessened.

The machine, designated as model F-1, is highly effective for joining wire coils and is applicable in many wire drawing operations. Lateral movement of the platen is timed and regulated automatically to correspond to the welding heats and upset forces needed for various thicknesses and grades of wire stock, thus overcoming the principal difficulties in producing sound welds in high carbon steel.

A water-cooled transformer rated 30 kva at 50 pct duty cycle and a series-parallel switch, both of which are located in a fabricated steel frame, provide 16 points of heat. Alligator-type clamps exerting 6000 lbs of clamping pressure against the work are air operated by a foot valve. The dies are machined commensurate to the specific wire diameters and may be adjusted horizontally (L. H.) and vertically (R. H.). *Thomson Electric Welder Co.*

Circle 44 on postcard for more data

High Production Featured with Transfer Machine

This new in-line, part-through transfer machine, designed to machine aluminum transmission cases at the rate of 180 pieces per hour, has recently been installed at Detroit Transmission Div., General Motors Corporation. The machine covers a floor area of approximately 4000 sq ft, and measures 164 ft long by 24 ft wide, and has a total of 67 stations. In all, this unit has 120 drilling, milling, reaming, spot-facing, chamfering and tapping operations.

IN the first assembly operation, a bushing is pressed into place in the center of the transmission case. Bushings are automatically fed to the machine by means of a floor feeder and vibratory bowl. The second assembly operation occurs at the end of the machine and involves insertion of a shallow rectangular aluminum cup which in a succeeding operation is staked into place. The work cycle is 20 seconds on the 300-ton piece of equipment. Work pieces are positioned and clamped automatically and the machine has automatic lubrication. Drill heads are mist lubricated. The hydraulic system includes 29 pumps and the same number of tanks and filters.

The hydraulic tank capacity is 1080 gallons and it has a 412 gpm capacity. Tubing throughout the machine stretches for over a mile in length. There are 148 hydraulic cylinders with 42 compensated flow control valves.

The electrical system proves to be interesting with 3119 individual wires, which required 14,672 separate connections. There is a total of 80 miles of wire in the electrical system. The control panel is 82 ft long and weighs over eight tons. The operator console utilizes 310 neon indicating lamps and 69 control buttons. *Buhr Machine Tool Co.*

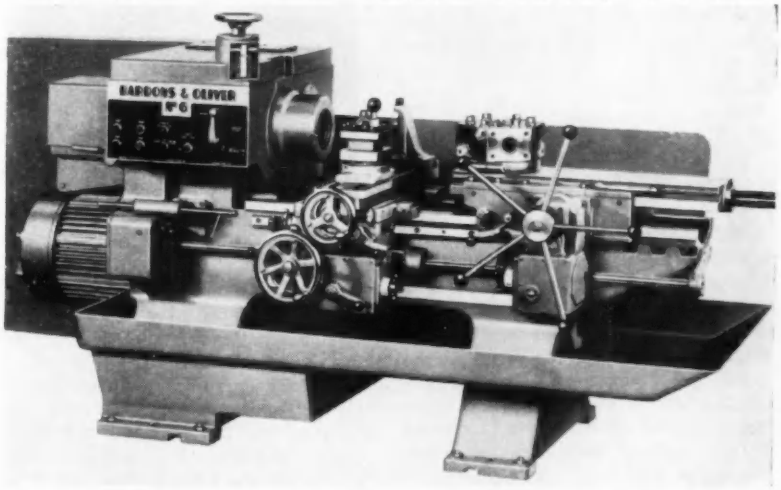
Circle 46 on postcard for more data

Drilling Machine

MACHINE serial 1310 is a vertical and horizontal 4-way single station drilling machine to drill, combination drill and ream spotface and counterbore automotive exhaust manifolds. The machine employs three hydraulic way type units with one unit having a 10-spindle head and the second a 4-spindle head. The third way type unit has a single spindle head. Two single spindle hydraulically actuated spindles are also used, one in a vertical up and the second in a vertical down position. These two units are each engaged in a combination drill and ream operation. The fixture is a 2-position fixture with the part piece being machined in each of the positions. The part is machined in position 1 after which the operator repositions the part in position 2 for additional machining. *Rehnberg-Jacobson Mfg. Co.*

Circle 45 on postcard for more data

Ram Type Turret Lathe Designed for Heavy Bar Work



A completely new ram type turret lathe offers three in. spindle capacity for heavy duty bar work, five in. spindle capacity for light duty bar work, and 21⅛ in. swing over the bed ways. The headstock provides 16 geared spindle speeds, constant horsepower (optional to 30) at all speeds, 50 to 1 speed range, spindle speed preselection and automatic spindle speed changes. Twelve fast feed changes are provided for the cross slide, carriage and hexagon turret. Bardons and Oliver, Inc.

Circle 47 on postcard for more data

Milling Machine

Two outstanding features of a new 15 hp milling machine are the swivelling head which makes possible the angular milling cuts crosswise to the table and the power quill for boring and drilling operations square with the face of the angular cuts.

The pendant control panel provides machine start and stop, spindle start and stop, spindle reverse, coolant, power rapid (jog), quill feed and rapid. All moving units are provided with effective locking devices that positively maintain all settings. Hand cranks positively disengage during power feed or rapid traverse. Automatic backlash eliminator permits climb milling in either direction. Swivelling vertical spindle head and quill positioning save time in setup for multi-cut operations. All power movements are automatically tripped off at the end of their respective movements by safety dogs. Safety clutch protects the feed mechanism against overload.

The machine has 24 speed selections by dial ranging from 20 to 1600 rpm. The table with 15 by 65 in. working surface has 36 in. longitudinal and cross feed rates are available in geometric progression from ½ to 90 ipm. Vertical feed range is ¼ to 45 ipm. Feed rates are easily selected by dial on the front of the knee. Top of table to spindle face is 0 in. minimum to 22¾ in. maximum.

Integral base and column casting and box type knee casting provide rigid direct mounting of gear trains for speed and feeds. Extra wide knee bearing and saddle length combined with column rectangular ways assure maximum rigidity. *Sunstrand Machine Tool Co.*

Circle 48 on postcard for more data

Automatic Grinder

Several all-new features have been designed into this precision centerless grinding machine. The machine in operation has an all-new rotary diamond tool for profiling the spaced grinding wheels. Another new development is the Landis Lockspeed regulating wheel drive for producing rounder workpieces and faster grinding cycles.

A new bed has been designed for the machine. The sturdier bed maintains better machine alignment.

The hydraulic oil tank, pump and valve controls have been designed as a separate unit and relocated at the rear of the machine. Because the oil reservoir has been taken out of the bed casting, heat from the hydraulic oil can no longer affect grinding accuracy by causing variations in machine alignment.

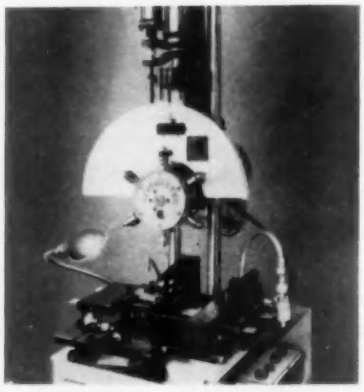
The new Truform dresser is available on these machines. Both slides are on preloaded balls for exact dressing and profiling of grinding and regulating wheels.

An automatic loader and elevator delivers valves to a loading chute on the machine. The automatic cycle moves a valve to the roller rest when the wheelhead is in the back position. Hydraulic feed advances the wheel rapidly to the valve and slow grinding feed removes stock to finish size. After a timed sparkout, the wheelhead retracts and the valve is ejected. *Landis Tool Co.*

Circle 49 on postcard for more data

Automatic Turret Drill

A new combination unit speeds precision drilling operations and reduces tooling costs by eliminating box fixtures and jigs. This bench model automatic 6-spindle turret drill with power feed is synchronized to the con-

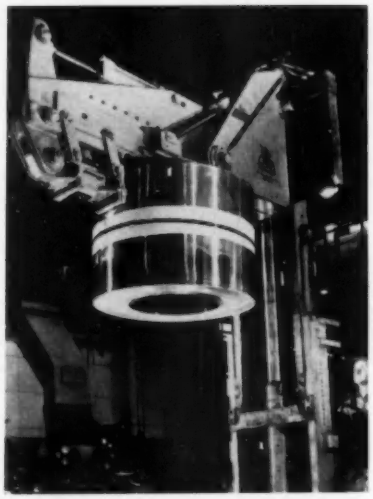


trols of an accessory manual positioning table which locates each hole center within 0.0005 in. The free loading table is mounted on ball bearings. A pointer over a template of the hole pattern guides the operator to each position. By releasing a thumb button on the operating handle, an air operated shot pin locks into the master pattern and simultaneously initiates the automatic feed stroke of the turret. The turret returns to "top stop," and at the next table position, repeats without indexing unless cycled by the push button on the side-mounted control panel. *The Burgmaster Corp.*

Circle 50 on postcard for more data

Fork Truck Attachment

This device, which is adaptable to any standard fork truck, can grab coiled metal stock weighing up to 6000 lbs, lift it and invert it from a horizontal to a vertical position in one operation. High pressure clamps ad-



just to any coil size and curvature while holding the coil securely. The coil manipulator is also useful in loading coils on trucks for transport. By flat loading, the dangers of coil movement are reduced as are the riggings necessary to hold the coil in place. *Bridgeport Brass Co.*

Circle 51 on postcard for more data

Wobble Head Welder

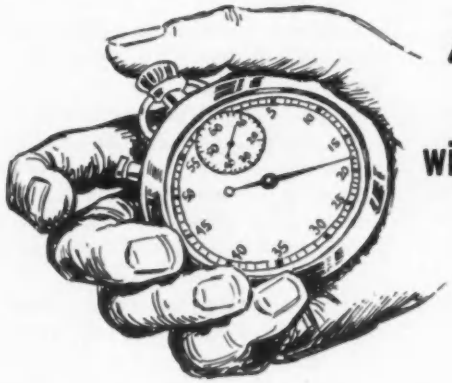
Faced with a production problem of welding three inch diameter thin walled tubing of 20 gage aluminized mild steel to the same material, *Motor Wheel Corporation* found the answer in a welding unit of new and unconventional design. The new unit features a wobble head that is shaped like a cup, manufactured by *Precision Welder and Flexopress Corp.*

An eccentric drive locks the cup electrode around the periphery of the weld, rotating it on edge with a rolling motion. This results in a clean, gas tight weld, Motor Wheel reports.

In this operation the wobble head welder is tooled with a three-position, straight-line indexing bottom electrode. The bottom electrode is split so that three tubes may be clamped in it side by side. The operator loads the bottom electrode, slips a pierced plate over the tube ends and makes his first three welds. Then he releases the tubes, reverses their position in the electrode, and welds a plate at the other end. *Motor Wheel Corp.*

Circle 52 on postcard for more data

split-second response!
more work per hour!



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DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

B110-3

Report on Machine Tool Builders

(*Continued from page 57*)

M-T EXPOSITION

To obtain the first-hand views of the builders on the Machine Tool Exposition, they were asked: "In your opinion, was the M-T Exposition productive in terms of new business—and did it meet your expectations from a business standpoint? Do you think an uptrend in new order receipts will ensue in the near future as a direct or indirect result of the Exposition?"

Typical of the response were the following:

Howard A. Finch, manager of marketing, Jones & Lamson Machine Co.—"It is too early to tell. We have every reason to believe the Exposition will produce orders."

Company Spokesman—"Exposition brought many inquiries. It remains to be seen if orders follow."

Company Spokesman—"Yes, many firm inquiries received."

H. A. Beyer, vice-president in charge of sales, DeVlieg Machine Co.—"Very good show from our standpoint. Stimulated much additional new business."

Company Spokesman—"Very worthwhile. Expect an uptrend in new orders."

Joseph P. Crosby, vice-president, sales, The Lapointe Machine Tool Co.—"Yes, we do believe the M-T Exposition surpassed our expectations. We gathered more inquiries that appear to be excellent potential purchasers than we had ever expected. The uptrend in new orders is inevitable. The interest and enthusiasm of the visitors is definitely going to result in new business."

Company Spokesman — "Too early to tell if the Exposition was productive in terms of new business. There should be some upswing, but how great is questionable."

Company Spokesman—"Yes. Some uptrend from this source, but slight."

Andrew H. Siebold, sales manager, Onsrud Machine Works, Inc. —"Small increase expected in the near future and a sound long-range trend upward expected, resulting from new machining methods."

Company Spokesman—"Did not participate in Exposition. Think there will be an upturn in new orders in fourth quarter due to hold-up on orders prior to the show."

Company Spokesman—"We will exhibit again in '65 for same (negative) reasons. Everyone came home with feathers, no scalps."

Ralph Lagerfeldt, executive vice-president, Colonial Broach & Machine Co.—"Yes, very good."

Company Spokesman—"Yes, the interest shown (1200 inquiries) was vastly superior to our guess."

Company Spokesman: "Yes, already is apparent."

Company Spokesman—"Economy is the key. Exposition only lets customer know what is available. The ups and downs of capital goods indexes verifies this."

Company Spokesman—"Exceeded expectations. Hopeful orders next few months will do the same."

Company Spokesman—"Do not believe the show itself produced enough new business to justify expense."

Company Spokesman—"Yes, at least temporarily."

A. V. Bodine, president, Bodine Corp.—"Think M-T Exposition will definitely result in new business. We are well satisfied with results."

RECOMMENDATIONS

Finally, the builders were asked, "Do you have any personal recommendations to make to automotive industry officials which should be taken into account by them when planning for near-future machine tool acquisitions?" Typical comments follow:

Company Spokesman — "Longer lead time needed to produce machines."

Company Spokesman—"Do not cut the lead time so short that expense is run up."

Company Spokesman—"Machine tools only key to cost reduction."

Company Spokesman—"Better anticipatory planning to provide complete engineering information commensurate with required delivery dates."

Company Spokesman—"Earlier decision on machine requirements."

Ralph Lagerfeldt, executive vice-president, Colonial Broach & Machine Co.—"We are able to present new or improved machines and tools at this time, including automation and special material handling."

Company Spokesman—"Buy now, save money and delivery time later."

Company Spokesman—"Because of the tight price situation, master mechanics and purchasing agents should be sure that comparisons of bids in detail meet their specifications (a tendency to compare apples and oranges!)."

Company Spokesman—"Machine tool standards applicable to automotive people vary within company plants. This leads to delays in delivery and to added costs of these tools." ■

MACHINERY NEWS

(*Continued from page 60*)

to the abrasive belts at speeds usually between 6 and 36 fpm, varying with the depth of cut, type of stock, and surface finish desired.

Instrumentation and accessory equipment are also interesting. An X-ray gage, automatically traversed across the strip, continuously records stock thickness on a paper chart. The large underground Delpark filtration system delivers collected swarf to a self-dumping hopper at floor level.

There is a nearby spot welder which attaches a lead strip to the end of each coil. Integral power hoists with canvas slings handle changes of the heavy (600-lb) steel contact rolls.

Electrical circuitry is so arranged that in case of belt breakage or low oil supply, the power is shut off and brakes applied to rotating parts. The setup also has a built-in CO_2 fire extinguishing system.

in 1960...

LOOK TO

McKAY MCK MACHINE

FOR PROGRESS IN METAL PROCESSING

... no machine manufacturer puts more into its products than does McKay Machine. For a look at some of today's latest developments in production equipment, please turn the page.

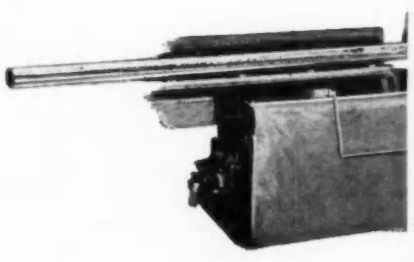
LOOK TO

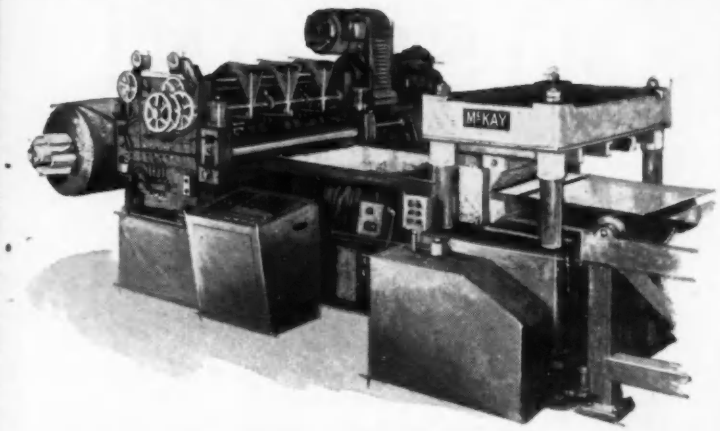
McKAY

MACHINE

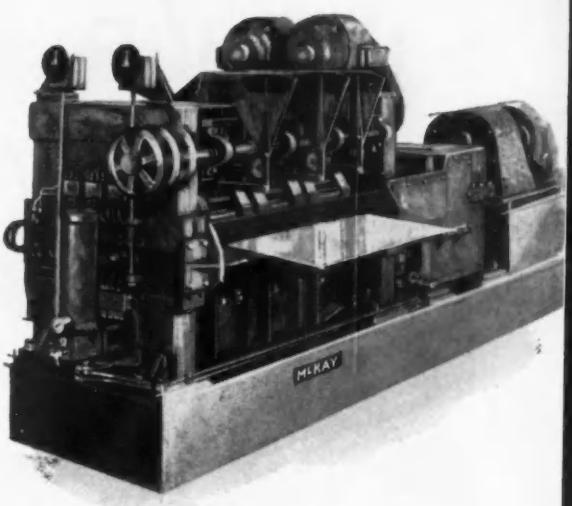
FOR PROGRESS IN METAL PROCESSING

McKAY PIPE MILLS





McKAYMATIC* DIE SHEAR LINES



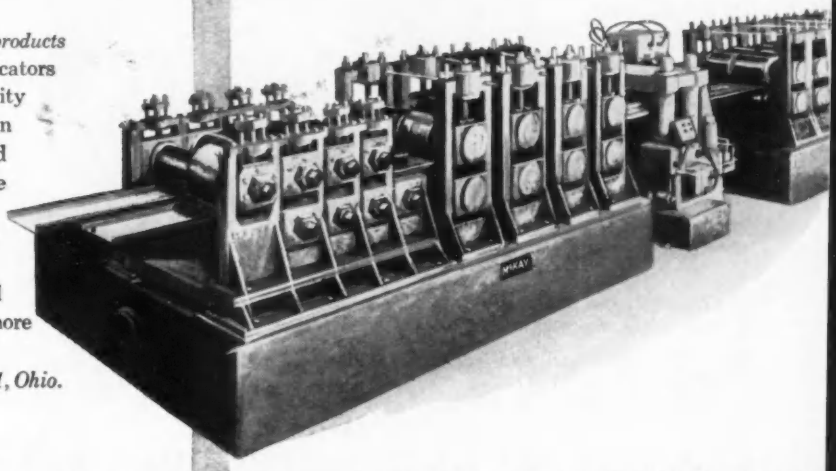
McKAY ROLLER LEVELERS

No machine manufacturer puts more into its products than does McKay. Metal producers and fabricators have learned they can expect and get integrity and honest value—the most advanced design and engineering—the finest construction and service—when they specify McKay Machine metal processing equipment.

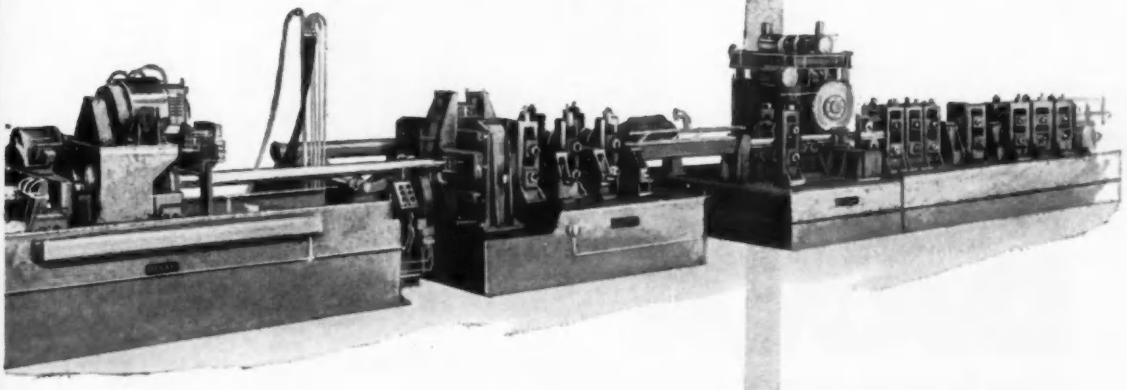
Look to McKay Machine in 1960 for more automatic machines, like those illustrated here, well conceived and skillfully developed to help you do your work faster, better and more economically than ever before.

The McKay Machine Company, Youngstown 1, Ohio.

*TM



McKAYMATIC* FORMING MILLS



Circle 127 on Inquiry Card for more data

SPICER INTRODUCES NEW TRANSMISSION!

Extra-Heavy-Duty 8000 Series Direct on 5th

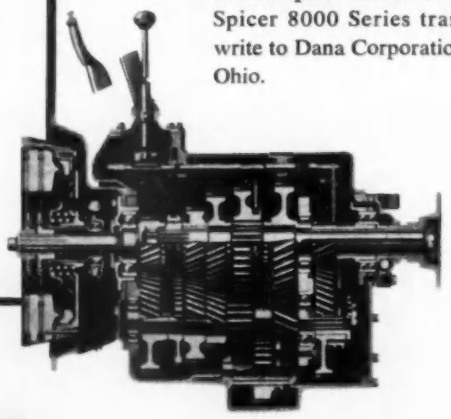
Here is the extra-heavy-duty transmission that truck fleet operators have demanded! The new Spicer 8000 Series 5-speed transmission is the largest capacity direct-on-fifth transmission on the market. It is designed primarily to complement big diesel engines.

With the new 8000 Series Spicer transmission, top vehicle speed is obtained in direct drive. Ratios of the new transmission are spaced so that they are functionally split or compounded with ratios of 2- and 3-speed axles and 3- and 4-speed auxiliary transmissions. Spicer 14" 2-plate and 15½" 2-plate clutches are matched to work at top efficiency with this new 8000 Series unit.

Ratios in the standard 8052 (iron case) and 8054 (aluminum case) and the optional 8052-A and 8054-A are:

RANGE	STANDARD MODELS 8052 and 8054	OPTIONAL MODELS 8052-A and 8054-A
1st	7.30 to 1	5.68 to 1
2nd	4.54 to 1	3.13 to 1
3rd	2.75 to 1	1.71 to 1
4th	1.65 to 1	1.29 to 1
5th	1.00 to 1 (direct)	1.00 to 1 (direct)
Reverse	7.00 to 1	5.47 to 1

NOTE: The 8031 and 8035 Series Spicer auxiliary transmissions have been augmented by a new underdrive ratio of 1.19 to 1 to better complement the ratios of the new Series 8000 direct-on-fifth transmissions.



For complete information on the new Spicer 8000 Series transmissions, write to Dana Corporation, Toledo 1, Ohio.

DANA Spicer

DANA CORPORATION

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Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

Circle 128 on Inquiry Card for more data

Ford "H" Series Tractors

(*Continued from page* 51)

number of weight saving aluminum and fiberglass components.

The "H" line includes four Diesel series: HD-950 and HD-1000, single rear axle tractors; and HDT-850 and HDT-950 tandem axle tractors. The corresponding gasoline-powered series include: H-950, H-1000, HT-850, and HT-950. GCW ratings for the line range from 55,000 to 76,800 lb.

The tractor has an 82-in. dimension from the bumper to back to cab; and only 83-in. with the optional sleeper cab. In states where maximum length of the tractor-trailer combination is limited to 50 ft, the Ford Diesel is well suited to pull trailer combinations up to 40 ft in length.

Cummins Diesels offered in the line include: NH-180, NH-195, NH-220, NHE-180, and NHE-195. The three Super Duty V-8 engines available for the line have displacements of 401, 477, and 534 cu in.

Single rear axle models range in wheelbase from 126 to 176 in., and are available in a variety of Eaton and Timken single- and double-reduction axles, as well as two-speed axles with ratings from 21,000 to 23,000 lb. Spicer and Fuller five, eight, ten, and 12-speed main transmissions; and three- and four-speed Spicer auxiliary transmissions are available.

Tandem axle models range in wheelbase from 138 to 246 in. These offer a wide range of ratios in either Eaton or Timken tandem axles, ranging in capacity from 23,000 to 38,000 lb, and including Page and Page suspensions if specified. In main transmissions there is a choice of Spicer and Fuller units of 5, 8, 10, or 12 speeds; and a choice of three- and four-speed Spicer auxiliary transmissions.

Other features include: high tensile steel chassis frames; automatic radiator shutters; air brakes; 13- and 14-in., two-plate clutches; either conventional Gemmer, or power steering; parallel-sweeping windshield wipers; printed electrical circuits; new heater-defroster unit; and others. ■

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1492 Chardon Road, Cleveland 17, Ohio

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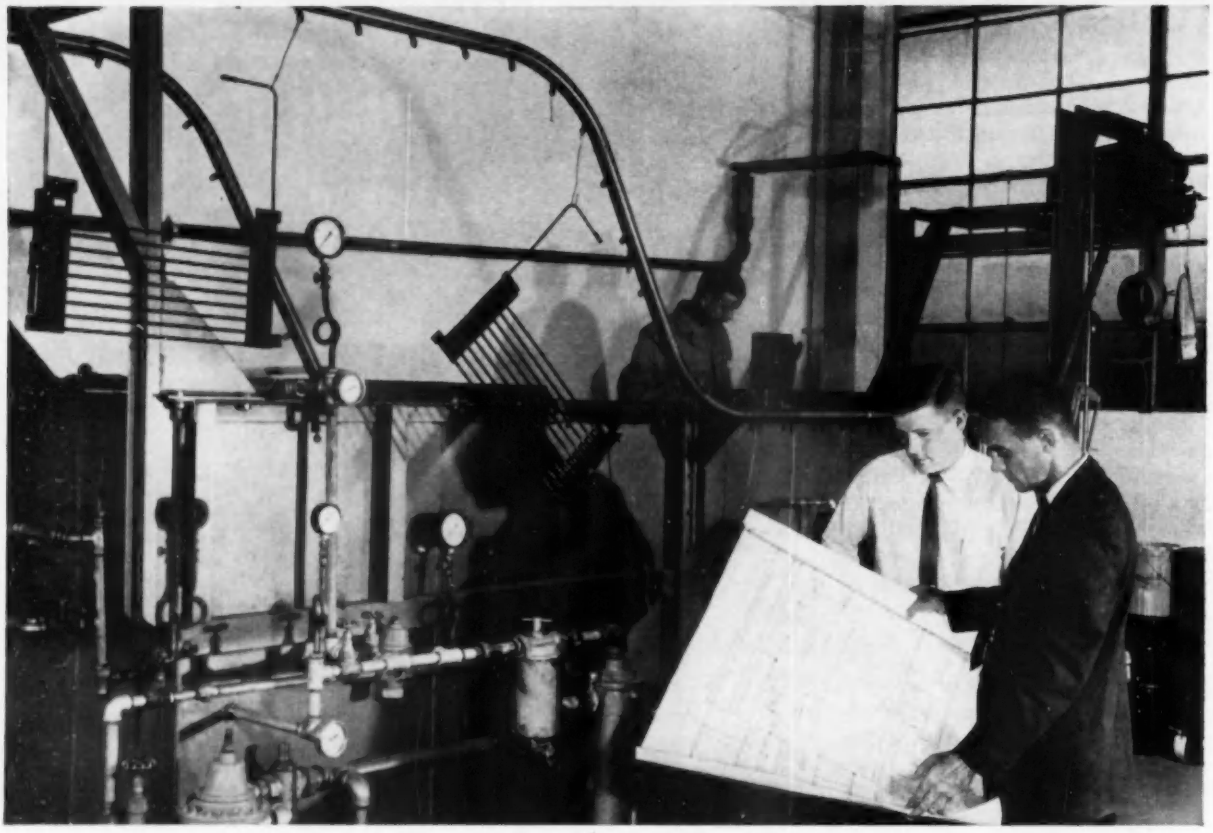
DU PONT TRICLENE® TRICHLORETHYLENE FINISHING NEWS



This unit demonstrates nonflammable painting process to visitors at the Chicago Plant of G. S. Blakeslee & Company. Among its other functions are: painting of sample parts for prospective machine purchasers and checking out improved design features for construction of new units.

Now another metal fabricator selects "Triclene" Painting—

TRICHLORETHYLENE

Several production units already installed . . . still more in design stage

A large manufacturer of lighting fixtures, after a successful demonstration of painting his product by the "Triclene" method, recently installed a unit of his own. Careful consideration was given other methods, but "Triclene" Painting won out for its space-saving advantage and inherent safety.

Eleven other manufacturers are now using "Triclene" Painting Systems in production operations. Scores of progressive metal fabricators across the country are making detailed evaluations to apply cost-cutting "Triclene" Painting to their operations.

The complete three-stage "Triclene" Finishing System—Degreasing . . . Phosphatizing . . . Painting—introduced last year, met with immediate success. One of the first to adopt it was a large automotive manufacturer (photo at right).

If you are considering expansion or replacement of your present finishing operation, call Du Pont for more information and help in evaluating "Triclene" Finishing.

"TRICLENE" Finishing is a revolutionary new way to finish metals. Clean, phosphatize and dip or spray paint continuously in a single medium of nonflammable "Triclene" trichlorethylene. Use processes singly or in combination to suit any metal finishing need.

"TRICLENE" PAINTING offers major advantages

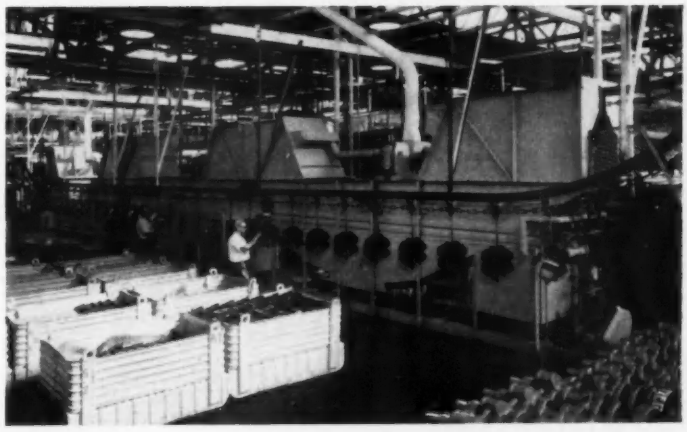
1. **Low investment:** Often eliminates baking ovens; no drip pans needed. Fewer steps mean in-process inventory and conveyor length can be reduced by over 50%.

2. **Economy:** Operating costs reduced by as much as 30% through overspray re-use and recovery of most of the nonflammable "Triclene" thinner.

3. **Reduced plant space:** "Triclene" Painting can be done in less than one-half the space usually needed, as fewer steps are required.

4. **Nonflammable:** Increases safety. Fire hazards minimized. Insurance rates are often lower. Elimination of costly fire protection equipment.

5. **Versatile:** Dip or spray-in-vapor cycles can be selected. Combines readily with "Triclene" Vapor Degreasing, Phosphatizing Processes.



Finishing line in automobile plant includes complete 3-stage "Triclene" Vapor Degreasing, Phosphatizing and Painting units. Turns out 2,400 finished parts per hour. Operating since 1959, it's one of the first installed. Unit requires only 65 linear ft. in comparision with 150 ft. needed for conventional system.

If you want to evaluate a "Triclene" process for your operation, a Du Pont technical representative will call at your convenience. He can assist you by using our exclusive cost analysis procedure, which will help you determine quickly the savings these processes can bring to your operation. Just fill out and mail coupon below to:

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department—Chlorine Products Division
Wilmington 98, Delaware

I'm interested in evaluating Du Pont "Triclene" Finishing for

☐ **CLEANING** ☐ **PHOSPHATIZING** ☐ **PAINTING**

☐ I would like technical literature describing these processes.

☐ Our Company would consider replacement of existing equipment if we can be shown economic justification. Please send me your Finishing Data Sheet.

☐ We have an immediate need for new finishing equipment to be installed by_____(target date)

Please have your representative contact me.

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Address_____

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F-11

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AMC's New Cars

(*Continued from page* 49)

Six and V8 models also is available on the Ambassador V8.

The Ambassador's 250-hp V8 engine is equipped with a two-barrel carburetor. It has a bore of 4 in. stroke of 3¼ in. and piston displacement of 327 cu in. Compression ratio is 8.7 to 1.

A 278-hp V8 engine featuring a four-barrel carburetor, a compression ratio of 9.7 to 1, and a dual exhaust system is offered as optional equipment.

Three transmissions are available. The Flash-O-Matic, operated by a push button, is offered as optional equipment. Optional overdrive for standard synchromesh also are offered.

On cars shipped to California a crankcase ventilating system will be used.

Power steering, power brakes, power-lift windows, "Twin-Grip" differential, Solex glass, and Power-Saver Fan are optional on all Ambassador models. ■

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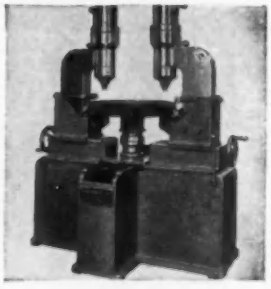

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543 South Wolf Road • Des Plaines, Illinois
PNEUMATIC AND HYDRAULIC SYSTEM COMPONENTS

The New Cars for 1961

(*Continued from page* 37)

transmission options and axle ratios. Thus it is possible to tailor any special kind of performance by the selection of strictly shelf features.

To the writer the brightest picture, common to all Sixes and the Pontiac Four, is the accessibility for maintenance of all engine accessories and for replacement of spark plugs. It marks a return to the "good old days."

Dual exhaust systems are mostly out of the picture, except on high priced cars. And that is just as well considering everything. With the advances made in engine design, the single exhaust system provides an ample margin of overall efficiency. Nevertheless, some makes still offer dual exhaust as an option. Among the high priced cars Cadillac has shifted altogether to a single exhaust system with a single muffler and a separate resonator.

The closed-crankcase ventilation system by AMA agreement is offered on all cars destined for California, is available on special order for any other region, and is standard equipment on several new engines, including the new 390-cu in. engine in the Ford family.

Cast crankshafts, once strictly a Ford Motor Co. feature, now are used extensively on new engines in the General Motors family. Arma-Steel crankshafts, produced by the Central Foundry Division, are standard in the 389-cu in. Pontiac V-8 and in the Tempest Four; standard in the 215-cu in. aluminum V-8 for the Buick Special, F-85, and Tempest; and on the light-duty V-6 truck engines built by the GMC truck & Coach Division.

The Chrysler family of engines is distinctive this year in employing the AC alternator, instead of the conventional 12-volt d-c generator; aluminum distributor; and a solenoid-shift starter. These ad-

(*Turn to page* 100, *please*)

Circle 131 on Inquiry Card for more data

Circle 132 on Inquiry Card for more data ——→

Stop looking for spring wire in large coils...it's here (*courtesy of Roebling*)

This is really an enormous availability – 3000 pounds of high carbon spring wire in a single, nonstop coil. You know what this means. Uninterrupted productivity. You make more of your products faster and, as with *any* length of Roebling spring wire, you make them better.

This, of course, is in addition to the already wide selection of Roebling wire in all kinds of sizes and gauges. Whatever you specify in spring wire – for quality – the word that comes first is Roebling.

For information on *any* size coil, ask Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

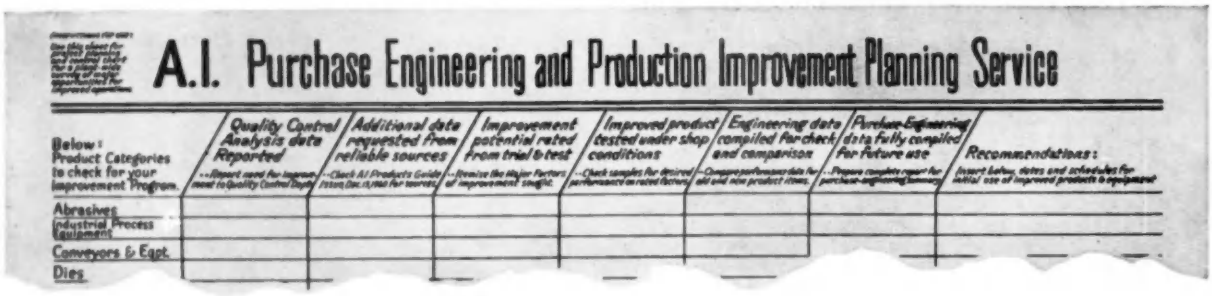
ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

AUTOMOTIVE INDUSTRIES

PRODUCTION IMPROVEMENT PLANNING SERVICE

A New Service of the 1961 AI Products Guide and Buyers' Directory


A.I. Purchase Engineering and Production Improvement Planning Service
Below: Product Categories to check for your improvement Program.
Quality Control Analysis data Reported
Additional data requested from reliable sources
Improvement potential rated from trial & test
Improved product tested under shop conditions
Engineering data compiled for check and comparison
Purchase-Engineering data fully compiled for future use
Recommendations:
Abrasives
Industrial Process Equipment
Conveyors & Eqpt.
Dies

What the AI Production Improvement Planning Service Is:

Basically, it is a new working tool for Production, Engineering, Purchasing, and Management executives in the automotive manufacturing market. It is designed to make the job of purchase engineering easier for them. For the advertiser in the 1961 AI Products Guide and Buyers' Directory issue, it provides an unequalled opportunity for supplying technical information and sales follow-through to the automotive executives who specify or initiate purchases.

How the Production Improvement Planning Service Works:

AUTOMOTIVE INDUSTRIES will bind the 22" by 28" worksheet illustrated here into the 1961 Products Guide and Buyers' Directory issue (issue of December 15, 1960). In addition, AI will supply the worksheet to the executive in charge of Engineering and Production in each of the 6,200 automotive manufacturing plants in the U.S. This worksheet is the first effort for the automotive industries to provide a standard step-by-step program for product evaluation and improvement. Advance research revealed the need and the validity of this tool, in which the following product categories are itemized:

Abrasives / Automation Equipment / Casting & Steel Processing Mtls. / Chemicals Conveyors & Equipment / Electrical Equipment / Electrical Materials / Fasteners & Equipment / Fixture Components / Furnaces & Heat Treating Equipment Gauges & Testing Equipment / Hand Tools / Hydraulic Equipment / Industrial Process Equipment / Lubrication Equipment / Mtls. & Processes for Tooling Machine Tools / Metals / Metal Cleaning & Finishing Equipment / Paint & Painting Equipment / Parts & Components / Petroleum Products / Powered Hand Tools Powered Ind. Trucks / Pneumatic Equipment / Process Controls / Rubber & Plastic Materials / Safety Equipment & Materials / Textile & Leather Mfg. Materials / Tools & Dies / Welding Equipment & Supplies

How Advertisers Can Tie In With the Production Improvement Planning Service:

Advertisers in the 1961 AI Products Guide and Buyers' Directory issue will have the opportunity to indicate their product improvement factors, available technical literature and engineering services on a special 8½" by 11" Data Sheet. These Data Sheets, furnished by the advertiser, will be mailed by AI to the key man in each of the 6,200 automotive plants, along with the basic worksheet. Through this method, advertisers can have their product improvement story in front of the right people at the right time . . . in addition to their sales messages in the advertising pages of the AI 1961 Products Guide and Buyers' Directory issue.

AI Plan of Action for Engineering and Production Executives:

1. Locate items that need improvement / 2. Analyze the need for improvement 3. List the factors of each problem / 4. Locate sources for improved products and services (use the Automotive Industries Products Guide Issue for handy reference) / 5. Obtain the specific application data that you need / 6. Test and try the product proposed / 7. Compare actual improvement factors / 8. Prepare purchase-engineering data report / 9. Follow up purchase-engineering report with production change orders and specification sheets for engineering standards 10. Analyze results of improved operations and report to each department: Production, Engineering, Purchasing and Standards

This is the plan top executives in the automotive manufacturing market will be following this December. You can tie in to this evaluation process for the first time through Automotive Industries' 1961 Products Guide and Buyers' Directory, which features the new Production Improvement Planning Service.

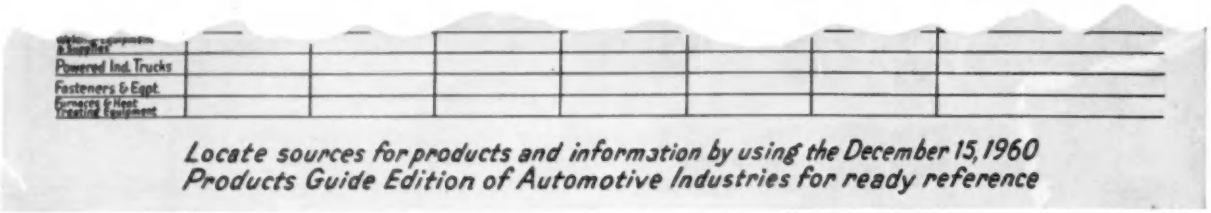
Issue Date: December 15, 1960

For more information: Contact your nearest AI regional manager. Offices in Philadelphia, New York, Cleveland, Chicago, Detroit, Atlanta, Dallas, San Francisco and Los Angeles.

AUTOMOTIVE INDUSTRIES

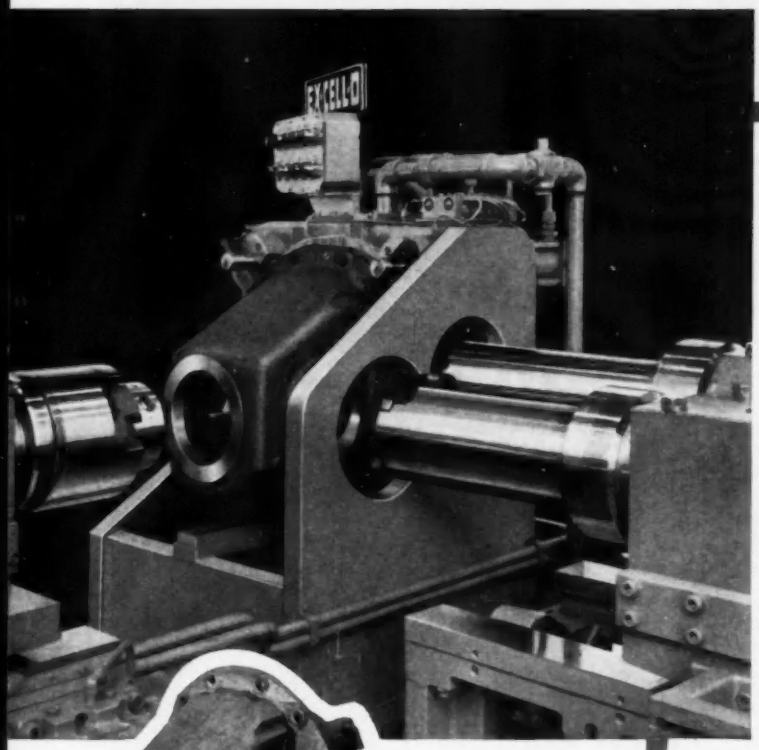
A CHILTON PUBLICATION

56th & Chestnut Streets • Philadelphia 39, Pa. • SHerwood 8-2000



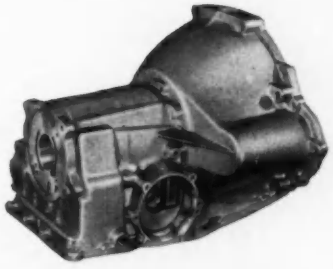
Locate sources for products and information by using the December 15, 1960 Products Guide Edition of Automotive Industries for ready reference

Ex-Cell-O Custom Machines Specialize in Difficult Jobs!



HEAVY-DUTY BORING—Custom Boring Machine uses three heavy-duty Ex-Cell-O Precision Spindles to simultaneously finish-bore four holes and bore-and-face a fifth hole in this 75-pound cast-iron housing in a 4½ minute cycle. Diameters are about 6"; tolerances are held within .001".

MULTI-DIAMETER BORING—In a single cycle, the long boring bar on this Custom Machine line-bores two holes while shorter bar below it bores a third diameter, and small spindle in foreground bores a dowel hole in this huge clutch and gear housing.



HIGH PRODUCTION—Aluminum transmission case shown above is turned 90°, rolled over 180° as it passes through a 24-station Custom Machine. Automatic operations include precision boring, facing, chamfering, radial milling, tapping, trepanning, air gaging and flushing. Output is 124 parts per hour.

Whether you have a simple job that must be done faster and more accurately, or complex work that requires multiple machining operations, an Ex-Cell-O Custom Machine may be just the answer you've been looking for . . . the economical solution to a difficult production problem.

See your Ex-Cell-O Representative, or contact Ex-Cell-O's Machinery Division in Detroit for details on the limitless applications of Ex-Cell-O Custom Machines.

EX-CELL-O FOR PRECISION

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • CONTOUR PROJECTORS • GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • RAILROAD PINS AND BUSHINGS • DAIRY AND OTHER PACKAGING EQUIPMENT

Machinery Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

60-31

Circle 133 on Inquiry Card for more data

udylite

research 'punch' breaks through the semi-bright nickel plating barrier!

the udylite corporation

✳ BRAND NEW PROCESS is easier to operate and control, provides better uniformity of color and greater production efficiency than ever before!

here's why:

NO HARMFUL BREAKDOWN PRODUCTS. There are no harmful materials formed from the N2E addition agents as a result of the plating process! Thus, batch treatment is necessary only when contaminants from other sources enter the bath and continuous carbon filtration will not remove them. The result is a substantial saving in solution, downtime, manhours and additional chemicals ordinarily required to treat and rebuild the plating bath.

CONSISTENT UNIFORMITY. N2E addition agents are noncritical in concentration. Reasonable variations from recommended concentrations will not seriously affect the characteristics of the deposit. Overall uniformity of color is maintained. Even in deep recesses on the backs of intricate die castings, amazingly clean deposits are obtained.

WIDE CURRENT DENSITY RANGE. N2E's average current density range is 30 to 60 amperes per square foot, with a considerably higher limiting current density. This wide range permits faster plating at a higher average current density without burning.

GREATER TOLERANCE TO METALLIC IMPURITIES. The absence of harmful breakdown products is of special importance in connection with metallic contaminants, since the undesirable effects of the two are cumulative. Another N2E 'plus' factor that helps maintain uniformity and quality.

ADHESION GREATLY IMPROVED. Production experience over a considerable period of time has conclusively demonstrated the excellent adhesion characteristics of Udylite N2E in combination with the Incomparable '66' Bright Nickel Process.

ECONOMICAL CONTINUOUS FILTRATION. One of the outstanding advantages of N2E is the fact that the bath can be continuously filtered through an activated carbon pack without appreciable loss of brighteners. The cleaning action of the continuous carbon filtration permits long periods of uniform, high quality production. The stability of N2E addition agents also permits economical bath purification by low current density electrolysis.

CAN BE ADDED DIRECTLY TO BATH. N2E addition agents are liquid and can be added directly to the bath without the use of filters. For high-speed operation, air agitation of the bath is recommended, although N2E performs well with mechanical agitation and can even be used without agitation.

See for yourself what N2E can do to improve your plating operation. Submit one of your problem parts for test plating now. See your Udylite representative. Or, write or phone:

detroit 11, michigan • on the west coast: L. H. Butcher Co.

world's largest plating supplier

udylite

Circle 134 on Inquiry Card for more data

FARNBOROUGH AIR SHOW

(*Continued from page* 43)

miles at 340 mph, using four Rolls-Royce Tyne turboprops.

Handley Page presented a model of its HP-117 all-wing jet transport foreseen as carrying 300 passengers at some $31 each on an Atlantic crossing. Still in the design study stage, the project embodies laminar flow—ducting engine power to smooth out the surface boundary layer and reduce drag — into which this company has done the most research in Britain.

One new aircraft demonstrated at Farnborough was the Avro 748 which first flew in June. Intended as a DC.3 replacement, this twin-engined turboprop with Rolls-Royce Darts is a short medium-range fully pressurized airliner seating up to 44 passengers.

Among new engines, Bristol Siddeley released a few details of its BS.75 ducted fan jet, which produces 7350 lb thrust with a dry weight of 1485 lb. The high by-pass ratio of 1.6 to 1 is stated to provide improved fuel consumption, higher take-off power and lower noise level compared to an engine of equal cruising thrust.

Rolls-Royce display the RB.141 by-pass jet, initially rated at 15,000 lb thrust, which has been chosen for later models of the French Caravelle. A scaled-down version of this unit, the RB.163 of 9850 lb thrust, is under development for the DH.121 Trident.

The company also revealed that it is working on a jet-lift engine of exceptional power-weight ratio for VTOL aircraft. Believed to be designated RB.162, it is credited with developing nearly 17 lb of thrust for every pound of weight, or four times more than current propulsion jets. ■

Czech Vehicles at Brno Fair

(*Continued from page* 39)

16 in. with 7.00 x 20 tires.

There are independent propeller shafts to the two rear axles so that the vehicle can remain operational if one shaft is broken on rough terrain. The under-cab engine is a 452-cu in. aircooled Diesel rated at 92 hp at 2100 rpm, and the transmission includes a four-speed gearbox with two-speed reduction box.

The Czechs are planning to rationalize their tractor production, concentrating on a unified series of three basic models with many common parts. Displayed for the first time at Brno, the Zetor 3011 is an entirely new machine that fits midway in this projected range. It is powered by a 30-hp three-cylinder Diesel driving through a double-range five-speed gearbox giving 10 forward and 2 reverse ratios, providing speeds from 15 down to 0.65 mph. A dual clutch controls the transmission and live pto.

The largest tractor in the group is the existing Zetor 50 Super, seen at the Fair in improved form. This has a four-cylinder 50-hp Diesel and a four-speed dual-range gearbox. An 18-hp model is planned for 1962 to replace the present Zetor 25.

One novel exhibit in the farm machinery section was an electro-hydraulic servo mechanism for crosswise steering of tractor-mounted row-crop implements. The 7-furrow hoe intended for cultivating sugar beet and other root crops is positioned transversely behind the tractor by a hydraulic ram giving a total travel of 12 in.

Travel is regulated by a pair of wire sensing probes on the front of the implement frame. They touch the plant leaves in one pair of adjacent rows, closing a high-resistance electrical circuit to ground. Low-current relays control the hydraulic system that shifts the cultivator assembly to follow the parallel but irregular crop rows.

Electrical probes are suitable only for young plants, and are replaced by a mechanical sensing head with electric contacts when the plants are larger and their leaves overlap across the pilot row. For both methods only the tractor driver is needed, and he has a remote-control pushbutton unit for selection of manual or automatic hydraulic guidance. ■

More Uses for Welding at Chrysler Corp. Plant

(*Continued from page* 41)

nique, such as plant power supply. Chrysler has been working on the concept since last spring, but the equipment has been under test for just a few months. There would be decided advantages to spike welding, Hudson added, because of the smaller transformer and longer electrode life due to the shorter welding time.

Some of the projects now on the laboratory's program include standardization of welding wires, ring projections, and projection weld screws; design of projections for resistance and fusion spot welds; and general investigations of body solders, aluminum die-casting welds, carbon-nitrited parts, and fusion spot welding equipment. ■

Sikorsky Awarded $23 Million Contracts

Two contracts, totaling more than $23 million, have been received by Sikorsky Aircraft for S-58 helicopters for use by the Marine Corps and Navy.

The Marine Corps contract, for $19 million, is for HUS-1 troop and cargo helicopters which will be delivered during 1962.

The Navy contract, which also covers spare parts and technical publications, amounts to $4.6 million. It is for HSS-1N helicopters to be used in anti-submarine operations. Delivery will be made next year.

R/M engineers helped marine transmission manufacturers solve clutch problems for this 55-ft. Chris-Craft Constellation. Twin engines develop up to 550 hp, provide speeds to 23 mph; equipped with newly designed hydraulic aluminum marine transmissions with R/M sintered bronze clutch material.

Photo courtesy Chris-Craft

How Raybestos-Manhattan helped design clutch for new marine transmission

"The extensive friction material knowledge and experience of R/M engineers save us time and money when we are working on a new design for a clutch or friction part," says Carl Benson, assistant manager and chief engineer, Paragon Gear Works, Taunton, Mass.

Solve problems on spot

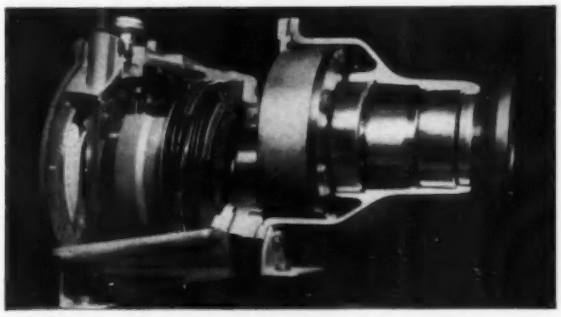
"In developing our new 'H-A' hydraulic aluminum transmission, we took an R/M engineer right with us to our customer's engine plant in Michigan. We solved our clutch problems on the spot.

"Our customers appreciate this extra engineering service we can offer them through R/M. Wherever we are we know we can pick up the phone and have the nearest R/M engineer come to us. We get this extra service, yet prices are competitive; quality is uniformly high."

Save time, money

You may also be able to save time and money by calling on experienced R/M engineers to help solve your friction problems. You can depend on sound, unbiased counsel on the material best suited for your application—for only *R/M manufactures all types of friction materials!* An R/M sales engineer can be at your desk within 24 hours.

Send now for your free copy of Bulletin No. 501—packed with helpful engineering information on friction materials.



Advanced-design Paragon "H-A" hydraulic aluminum transmission for Chris-Craft 430 engine which develops 275 hp at 4000 rpm. Clutch is self-compensating; no adjustment ever.

Pencil points to R/M sintered metal clutch facing. .015 in. of sintered bronze on .070 in. steel plate. Has a high coefficient of friction in presence of oil; strength to withstand 4000 rpm; precision operation within narrow clearances of .007 to .010 in.

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: Bridgeport, Conn. • Chicago 31 • Cleveland 16 • Detroit 2 • Los Angeles 58

NEW PRODUCTS AUTOMOTIVE-AVIATION

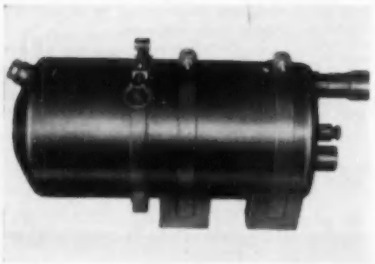
FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

New Oil Filter

Duplex oil filter, as announced, combines multiple filter housings into one compact filtration assembly. A one-piece, two-section filter element or cartridge handles both the full flow and by-pass filtering functions.

The full flow section of the dual assembly is connected in-line with the oil system, pumping up to 20 gpm. This section is provided with four by-



pass valves for variations in engine designs requiring different valve pressures.

The partial flow (by-pass) section bleeds oil from the pressure system for a direct return to the crankcase or sump. Check valves maintain a constant oil level, and prevents oil drainage, in the crankcase. The dual oil filter is available in two series—for engines over and under 200 hp; in both 500 and 750 cu in. capacities. *WGB Oil Clarifier, Inc.*

Circle 36 on postcard for more data

Muffler Protection

A new development has been announced to protect mufflers and other automotive parts subject to extreme heat, corrosion and wear. It is a chromium diffusion process called alphatizing.

Test mufflers, manufactured from mild steel and treated with this process were supplied to Mack Manufacturing Co. and to the Ordnance Tank-Automotive Command for field evaluation. Truck runs involving severe start and stop conditions, mountain terrain, and both arctic and desert climate were chosen. One muffler was still in serviceable condition after 500,000 engine miles. This muffler outlasted several tractors.

In alphatizing the chromium penetrates into the surface of the treated parts to produce a true alloy which is not a coating but an integral part of the parent metal. There is no bonding agent or bonding problem.

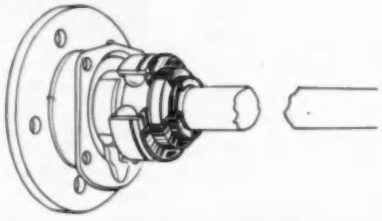
Ductility, weldability, corrosion and heat resistance can be developed to the degree desired. Spot and seam welding do not disrupt case continuity, nor does arc welding with a stainless steel rod.

Conventional heat treating furnaces can be used for the process. The only limiting factor is the size of the furnace equipment available. *Alloy Surfaces Co.*

Circle 37 on postcard for more data

Rear Axle Seal

A new type of oil seals for rear wheels, called Ad-A-Seal and "engineered with the mechanic in mind" have been introduced. According to the manufacturer, a major cause of rear wheel grease leaks on cars with tapered bearings is that they must have 0.013 to 0.23 end play. (From room temperature to operating tem-



perature the axle grows in length approximately 0.020.) This end play lets axle get out of center and away from the conventional sealing lips.

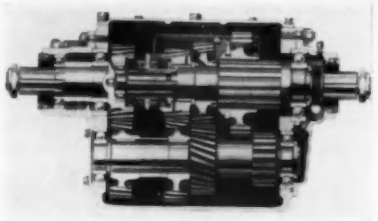
Ad-A-Seal's sealing quality is not affected when axle gets out of center since it seals by a completely different principle. *Better Part Specialties*

Circle 38 on postcard for more data

Truck Transmission

Two new four-speed auxiliary transmissions for medium and heavy duty trucks and tractors have been announced. With overdrive, direct, low and low-low in one compact, 375-lb unit, the new Fuller transmissions provide gear splitting ratios plus deep reduction.

The Fuller 4-B-73 is designed for use with engines producing approxi-



mately 500-600 lb ft of torque. Use of special high-capacity bearings permits the 4-B-75 to be used with engines in the 600-700 lb ft torque class.

Gears ratios for the new auxiliaries are: overdrive, 0.85; direct, 1.00; low, 1.24 and low-low, 2.22. *Fuller Mfg. Co., Transmission Div.*

Circle 39 on postcard for more data

Soft-Seam Adhesive

A strong, flexible, "soft-seam" adhesive, trade-named Bondmaster R379-20, has been designed for bonding closed-cell vinyl foam to itself and to fabric, as well as to phenolic and other plastics, to metal, wood, composition board and other rigid, semi-rigid and flexible materials.

This adhesive may be brushed, roll coated, or sprayed with conventional equipment to provide bonds which, in addition to the above, feature superior resistance to: salt water and high humidity conditions; fatigue and vibration; hot oil, gasoline, aromatic fuels and organic solvents; and prolonged exposure to temperatures up to 350 deg, the manufacturer reports. Surfaces coated with the new adhesive achieve bonds of foam-tearing strength instantly upon contact, thereby making it particularly applicable for mass production assembly operations. *Rubber and Asbestos Corp.*

Circle 40 on postcard for more data

Circle 136 on Inquiry Card for more data ——→

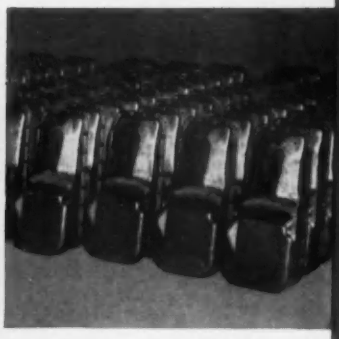
In T & W's engineering department the information about your job is studied carefully. Dies and production are planned to meet your requirements most economically.

With over 140 hammers and presses, T & W is equipped to produce a wide range of forgings, from a pound in weight to over 500 lbs.

T & W's wide range of stamping presses, economically produce stampings from 3" x 3" to large stampings 40" by 60" by 14" deep.

Fully equipped laboratories provide the control of quality required for space-age metals and products.

Excellent quality control makes T & W forgings and stampings reliable, one reason why they cost you less at your point of assembly.



Delivery to you is precisely scheduled to your requirements—a big, wide range operation like T & W has the reserve power to hold to commitments even in emergencies.

T & W CAN HELP YOU SAVE MONEY!

T & W's wide range facilities help you do it

Your part requirements can be produced most economically when the right *size* and *type* of equipment is utilized. Part cost economy is the result of planning by T & W people experienced with *know-how* for doing a good job without waste.

T & W's wide range of equipment, broad engineering knowledge in serving all types of industries, die designers, and production men all contribute to the T & W technique for saving you money. Ask to have a T & W sales representative call to give the details.

SALES OFFICES: PHILADELPHIA • OLD SAYBROOK, CONNECTICUT • CHICAGO
DETROIT • DALLAS • LOS ANGELES • SEATTLE

HOW WIDE RANGE FACILITIES HELP INDUSTRY

RADAR BASE STAMPING

Accurate to tolerance, and with cross-members already welded on by T & W, this 27" x 16" x 6" radar base is practically ready for assembly when delivered.

STEERING SPINDLE, UPSET FORGED

From its wide range facilities, T & W can choose the equipment to forge this 14" spindle, producing the required radial grain flow for maximum strength in the 5" head.

Write for information:

The booklet "Transue & Williams Challenges the Future" explains the wide range of facilities, and experience, which enables T & W to serve all American industry, and produce savings.

FORGINGS & DEEP DRAWN STAMPINGS

TRANSUE & WILLIAMS

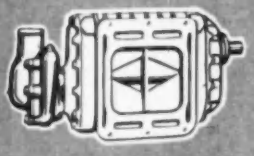
ALLIANCE • OHIO, U. S. A.

SCHWITZER

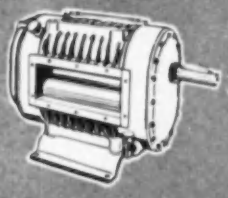
Fans

Fan Drives

Turbochargers



Superchargers



Air Pumps

Dampers

Pumps

Shaft Seals

PRECISION PRODUCTS

with

a

new

approach

INTERNATIONALLY ACCLAIMED

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CORPORATION
INDIANAPOLIS 7, INDIANA U.S.A.

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FREE COATED FABRICS MANUAL

Handy, 12-page, fully illustrated booklet describes in detail all basic specifications, properties, uses and performance characteristics for "Fairprene"* coated fabrics and cements.

Mail coupon or write for your free copy

E. I. du Pont de Nemours & Co. (Inc.)
Fabrics Division
Wilmington 98, Delaware

*"Fairprene" is Du Pont's registered trademark for its coated fabrics, sheet stocks and cements.

DU PONT INDUSTRIAL COATED FABRICS

DU PONT
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Better Things for Better Living . . . through Chemistry

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Fabrics Division, AI-11, Wilmington 98, Delaware

Please send me free copy of Du Pont's guide to coated fabrics for industry.

NAME_____ POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

(Advertisement)

Which spray method

	Conventional Spray	Hot Spray
IT ALL DEPENDS ON object size and form	Whether it's a missile or a light-bulb filament, conventional spray is practical with its wide selection of nozzle combinations and gun types.	Comparable to conventional spray for versatility and range of service. Permits heavier coating of vertical surfaces without runs or sags—better film build on corners and edges.
Where you paint	Practical almost anywhere, indoors or out. If spraying is prolonged, good ventilation is recommended.	The only method suitable for painting where temperatures are low or fluctuating. Because overspray is all but eliminated by this method, intermittent spraying may be done in the absence of a spray booth.
Requirements of the coating	For average coverage, conventional spray can yield fine quality as well as uniform finishes. Heavy coatings with mastics are attainable.	Provides much heavier film build using normal-solid-content materials; helps overcome blushing of lacquer; maximum flow-out minimizes orange peel. Excellent coverage of sharp edges and corners.
Film-build specifications	With average-viscosity paints, film builds up to .6 or .8 mils are attained with a single coat. Multiple coats are required for heavier coatings.	A single coat of heated paint frequently achieves twice as much film build as coatings applied by other spray methods. Less shrinkage during drying keeps corners and sharp edges more thoroughly protected with heavier dry film.
Properties of the coating material	Wide selection of nozzle combinations and gun models will handle practically every type of liquid or mastic, including highly abrasive ceramics and other coarse materials.	Lacquers, enamels, and organic materials whose viscosity is reduced by higher temperatures (under 180° F) are best suited to hot spray. Wide range of caps and tips allows selection of any type pattern or width desired. Sprays at pressures as low as 18 psi.
Speed of application	Rate of application is extremely wide to meet average and special needs. Adaptable to automatic processes with multiple guns where high rate of coating is needed.	Comparable to conventional spray in all respects, with added advantage of heavier film builds if desired.

(Advertisement)

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Airless Spray

Broad, plain surfaces provide the best opportunity for this method. Small objects or narrow surfaces (under 3") reduce efficiency.

Ideally suited for spraying inside cavities or enclosures, and indoors wherever paint rebound may be a problem with other spray methods.

Produces full, wet coats with good film build and coverage, particularly in corners and crevices.

Coating is very comparable to conventional spray for coverage. However, the wetness of the film makes it more susceptible to sags and runs on vertical surfaces.

Well suited for light or heavy liquid paints of relatively fine grind that do not contain abrasive pigments.

Produces a very large spray pattern for ultrafast coverage of large areas where close control is not a necessity.

An analysis of the job at hand, of the conditions under which painting must be done, of the type and quality of finish desired—all are important factors determining which spray method is best suited to your job.

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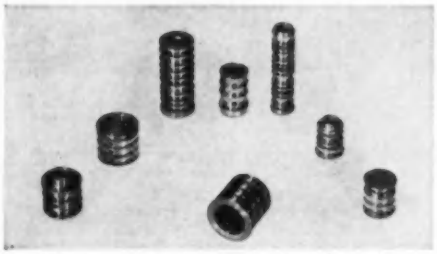
WHY MICROHONING* helps Hawk Guidance System "think" straight

The Army-Marine surface-to-air Hawk missile is the first of its kind to overtake and destroy a ballistic missile in a simulated enemy attack. Designed by Raytheon's Missile Systems Division, it is being built at their Andover, Massachusetts plant.



Representative range of valve sleeves Microhoned.

MICROHONING GENERATES ACCURACY

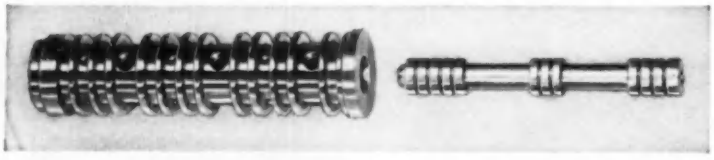
With consistent accuracy as a prime requisite, Raytheon engineers specify Microhoning in the processing of valve sleeves and blocks used in the servomechanism that guides the Hawk in its supersonic flight. Microhoning of bores rectifies geometric inaccuracies, size is held within .0003", roundness within .0001" tolerance, and a surface finish of about 8 microinches (rms) is generated.

MICROHONING'S VERSATILITY

Thirteen different sizes of sleeves and blocks are Microhoned, including those with blind-end, interrupted, and ported bores. Parts, which are generally of stainless steel heat treated to 58-60 R "C", have bore diameters ranging from .171" to .874" and lengths from .594" to 2.859".

STRAIGHT, CLEAN BORES

Microhoning of these components effectively corrects camber or bow in the bore and assures less smear around the ports than possible with any other machining method. Bore camber and smear could cause binding or a hindering action between the sleeve and its spool, and thus throw the missile off-course.



The strong emphasis on precision can best be appreciated in the realization that sleeves and mating spools must operate within a clearance of only 100 to 150 millionths of an inch. The fit of the spool within the sleeve must prevent blow-by. A final lapping operation provides geometric accuracy within .000050" tolerance.

For further details, see facing page.

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The New Cars for 1961

(*Continued from page* 86)

vances stem from the Chrysler electrical division which was established in Indianapolis only a short time ago.

Transmissions

Automatic transmissions too have been treated to major changes and improvements. Chrysler Corp. has new light-weight models with smaller profile to reduce size and weight and aid in reducing tunnel height.

HydraMatic is made in two different sizes, featuring a three-element fluid coupling for additional torque multiplication. All models are smaller, more compact, lighter, and aid in reducing tunnel height.

Buick too has two different types of automatic drives, both more compact and lighter in weight.

Mercury and Ford automatic drives have been modified by the introduction of a vacuum control within the case. This eliminates the usual linkage between the throttle and carburetor, shift control being handled automatically by means of the vacuum control unit.

Generally speaking, every make of automatic drive has been refined in one way or another to assure quick, smooth shifts.

Just as we have witnessed a revolution in engines with the shift to Sixes, so we have a similar situation with respect to transmissions. Of course there is nothing new in the fact that most cars list the 3-speed synchromesh transmission as standard equipment. What is new is that more people are buying the manual shift transmission, at least on lower priced cars and compacts. Moreover, there appears to be a heavy demand for 4-speed synchromesh transmissions now offered on many models. Latest trick is that more makes provide the floor-mounted straight stick to go with manual transmissions.

Just a short time ago there was a shift on power steering to a flexible coupling between the gear box and mast. The objective, of course, was to take care of normal misalignment and to facilitate servicing. This idea has extended to most

makes and for 1961 is found on manual steering gear as well.

The full-traction type differential—made by Ford, Borg-Warner, Dana Corp., and others and bearing their own trade name—generally is available this year on most makes.

We are also glad to report that the old reliable overdrive option is still very much in the picture on many makes and models.

Interesting note: the Corvair has soft - pedalled the independently fired car heater (making it optional) now has a perimeter heating system taking heat from the engine compartment.

One of the novelties this year is a magnetic drive speedometer found only on Plymouth and Imperial models.

Air conditioning systems, just as other accessories, are improved and simplified. One distinctive installation is on the Lincoln-Continental which features a retracting console at center of the instrument panel.

Materials

Now just a brief note on materials. 1961 cars have made greater use of zinc die castings; stainless steel for exterior decoration; and more aluminum for interior and exterior treatment. A good example is the Tempest grille which is a deep one-piece aluminum stamping integral with the wide surrounding molding.

Aluminum usage, industry-wide, has increased materially. Besides the aluminum used in the Corvair engine, there is now the all-aluminum GM V-8, and the all-aluminum OHV Six of AMC. More automatic transmission cases are made of aluminum. On the other hand, the Chrysler Slant Six engine intake manifold, which was made of aluminum the first year, has been changed to cast iron for 1961.

AMC unveiled some noteworthy "firsts" this year. One is the die-cast aluminum engine, the first in domestic production. Two is the ceramic-coated muffler. They all laughed when AMC announced it but AMC is guaranteeing this muffler for the life of the car in the first owner's hands. And that's saying a real mouthful. Three is a one-piece molded fiberglass head-

(*Turn to page* 103, *please*)

HOW MICROHONING corrects camber in components of Hawk Missile

Raytheon, designer and builder of Hawk missiles, is constantly seeking to improve processing methods and attain greater precision-production. One example of this is the processing of valve sleeves and blocks used in the steering mechanism of Hawk missiles. Here's how Microhoning corrects bore camber, minimizes smear around ports, generates geometric accuracies and microinch surface finishes.

CORRECTING BORE CAMBER

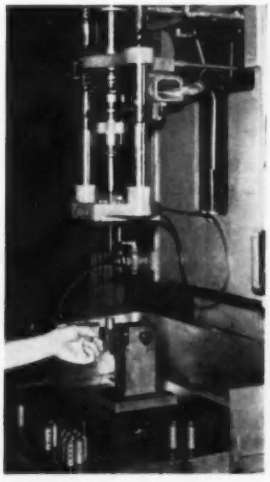
To straighten bore surfaces so that they are parallel throughout their length to the neutral axis of the bore, Microhoning utilizes the combination of: abrasive sticks of exact length, positive radial expansion of abrasives, and controlled rotating and reciprocating motions of the Microhoning tool.

Each Hydrohoner has automatic *size control, stonefeed and stonewear compensation.*

MINIMUM SMEAR AT PORTS

Thirteen different sizes of sleeves and blocks are Microhoned, including those with blind-end, interrupted, and ported bores.

The Microhoning characteristics of low-velocity abrading and constant widespread contact with bore surfaces eliminate more smear around the ports than is possible with any other machining method.



Simple fixturing and hand loading are part of this careful processing.

EFFICIENT PRECISION PROCESSING

In two Microhoning operations, from .002″ to .006″ stock is removed from the bores at an approximate rate of .001″ per minute. The rough Microhoning removes from .001″ to .005″ stock while correcting camber to within .0003″. The finish Microhoning rectifies geometric inaccuracies resulting primarily from heat treating of parts. Size is held within .0003″, roundness within .0001″ tolerance, and surface finish generated is about 8 microinches, rms.

For further details, see facing page.

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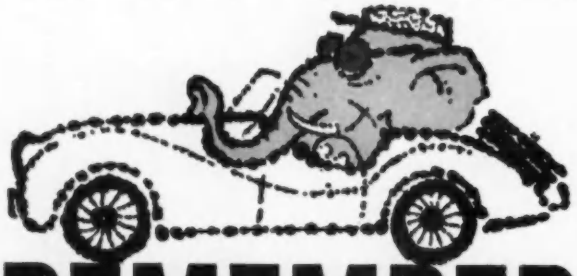

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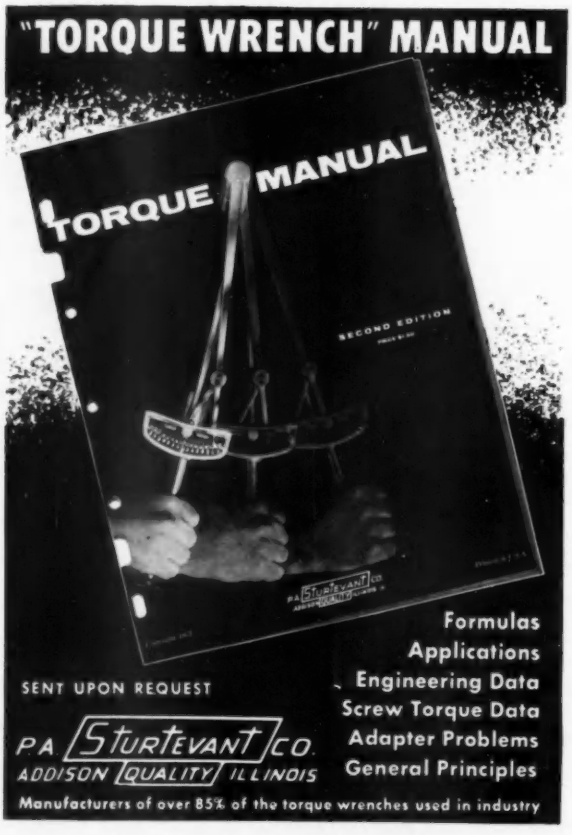
Manufacturers' News

Carter Engineering Co. Is Sold

Miniature Precision Bearings, Inc., Keene, N. H., has acquired Carter Engineering Co., Ferrysburg, Mich. Horace D. Gilbert, MPB president, said the acquisition enables Miniature Precision Bearings to expand its product line and provide an increase in non-military sales. Carter's manufacturing operations will be transferred to the Lebanon, N. H. plant later this year. MPB's Split Ballbearing Div. at Lebanon manufactures specialty ballbearings for materials handling and agricultural machinery and industrial machine tools.

Highway Acquires Weber

Highway Trailer Industries, Inc. has acquired Weber Trailer and Mfg. Co. as a step to expand sales and service and entry into West Coast manufacturing operations. The firm will be operated as a wholly owned subsidiary, Highway-Weber Trailer Co. It will continue to make its present lines of special and standard truck-trailers and will be the manufacturing outlet for Highway trailers and cargo-containers. John T. Weber, secretary-treasurer and general manager, was named president of the new subsidiary. He is the son of the late Tobias Weber, founder of the firm.



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(*Continued from page* 101)

lining. It's thick, it's sound absorbing, and it is easy to install.

Odd notes: more makes have adopted tapered roller bearings in front; more makes have adopted bonded brake linings as a means of increasing lining area and extending lining life; wheels come in 15-in., 14-in., and 13-in. sizes this year. It is interesting, however, that despite the swing to smaller wheels, certainly on smaller cars, the Tempest deliberately employs 15-in. wheels, primarily for better ground clearance but also as a styling feature.

Compact Trucks

Finally, we must not overlook the influence of the compact car chassis on truck design. Best evidence of such influence is that the major competitors—Ford, Chevrolet, and Dodge — offer midget trucks for 1961. Ford has the Econoline; Chevrolet the Corvair models; Dodge, the Dart ½-ton pick-up.

Headlamp styling has undergone considerable metamorphosis over the years. Many years ago Pierce-Arrow had headlamps faired into the front fender. Later on all cars had headlamps housed independently on their own pedestals. Now the 1961 Imperial has "classic free-standing" headlamps, four individual lamps on individual pedestals. Is this an augry of things to come?

Reliability Programs

Reliability has become a familiar term among manufacturers. More and more suppliers and vehicle producers are applying this procedure to their operation. This is indeed a serious matter and one that deserves real attention. The fact is that the customers have had too many troubles with their cars. Some of these problems have got back to the factories, others have stayed with the car owner or the dealer. Even minor troubles sometimes result in switching from one make of car to another in the hope of getting more reliability or better service.

In view of past experience, the fact that a reliability program has been established is not enough. It will have to be carried through and thoroughly policed to make sure it works. ■

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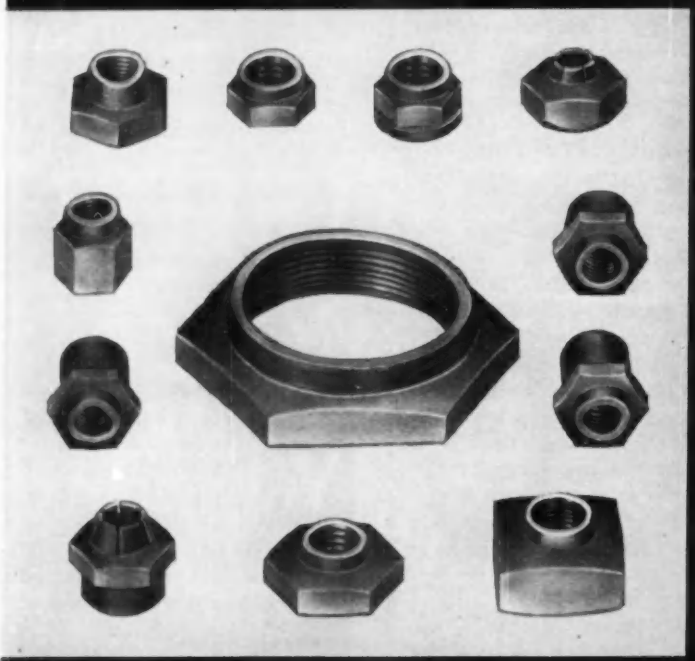

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By C. J. Kelly
ASSISTANT EDITOR

Vertical Head Mill 1

A two-color, six page brochure, number VBT-60, describes a new vertical head bed type milling machine model 3006. The bulletin provides plan drawings and specification and highlights all the machine's features. *Kearney & Trecker Corp.*

Marking Machines 2

A six page folder describes a line of marking machines that covers all types of identifying parts and tools. It is well illustrated and shows a brief operation description of each machine with a description of the work it will handle. *The Acromark Co.*

Design Manual 3

This valuable 76-page illustrated engineering design manual, Bulletin 212 G, offers a compiled listing of materials and specifications, recommended application and the latest technique for mounting tubing, wiring and similar hardware. Also includes the description of a complete line of clamps, brackets, shims and line supports for almost any application. *TA Mfg. Co.*

Temperature Crayons 4

Industrial temperature indicating crayons are described and illustrated in a new folder that contains a chart to show the different types and the temperature at which they change. Specifications and technical data are also given. *Princeton Div., Curtiss-Wright Corp.*

Weighing System 5

Combining scales with calculators and other equipment through use of a binary code, provides a new lost cost semi-automated weighing system for process, quality and cost control. The basic weight classification system is described and illustrated in Bulletin 3347-A. *The Exact Weight Scale Co.*

Fastener Data 6

Four pages illustrate and describe a line of standard and special fasteners for many different applications. A list is included to show where these fasteners can be employed to best advantage. Specification data and head styles are included. *Pheoll Mfg. Co., Inc.*

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Static Control 7

Bulletin GEA-6578A, 8 pages, describes a line of static control. Pictures and diagrams show how static control components simplify panel design and operation. Close-up photo shows G-E logic element, heart of the static control logic system. Cutaway photo shows panel construction while other pictures illustrate ease of wiring and installation. Application information and photos are also included in publication. *General Electric Co.*

Lathe Brochures 8

A jacketed packet of literature, includes individual brochures on each of the new J&L model 30 automatic lathes. All of these machines have the same basic bridge-bed design. A great variety of drives, slides, tracing units and machine variations can be adapted to suit each customer's individual requirements. With these variations three distinctively different versions of the model 30 evolve. They are the model 30-60 deg auto tracer; the model 30-2D 180 deg auto tracer and the model 30 multiple slide automatic lathe. *Jones & Lamson Machine Co.*

Mold System Data 9

Mold handling systems for efficient, economical handling of large, medium and small size molds are described, diagrammed and illustrated in new 12 page bulletin. Continuous or intermittent operation are covered. *C. O. Bartlett & Snow Co.*

Diamond Products 10

In catalog PG 395, are described a large variety of metal-bonded, diamond-impregnated products. Included are drills, wheels, blades, dressers, hones, laps. Charts and line drawings show specifications. *Fisch-Schurman Corp.*

Turret Lathe 11

The 3R turret lathe is illustrated and described in a four page bulletin. Close up illustrations show the new features of the lathe which is equipped for turning, chucking and single point threading, in addition to standard turret operations. Bulletin contains complete specifications and dimensional data for tooling. *Sheldon Machine Co., Inc.*

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Switches for Industry 12

A new circular, featuring an adjustable pulse switch, center neutral limit switch and proximity switch is now available. Illustrated are a wide variety of limit switches, explosion-proof switches, basic switches, pushbutton switches, mercury switches and toggle switches for use on machine tools and other industrial equipment. *Micro Switch, a Div. of Minneapolis-Honeywell Regulator Co.*

Wire Rope Slings 13

A new pocket card showing revised rated capacities of ACCO registered 8-part braided wire rope slings is now available. This handy 4 by 6½ in. card was designed to be carried in the pocket. It has a quick reference table showing rated capacities for the various sizes of 8-part braided slings used vertically, or as choker hitch or basket slings. The reverse side illustrates suggestions for proper sling care and use. *American Chain & Cable Co., Inc.*

Study of Gaging 14

A new brochure entitled "Modern Thickness Testing" has just been published. Included as part of this study is an informative description of the various nondestructive methods currently employed for measuring the thicknesses of organic and non-magnetic metal coatings (including phosphate) on iron and steel. The advantages and limitations of each method are thoroughly discussed in light of thickness measuring instruments now available. *Twin City Testing Corp.*

Drive Catalog 15

Named catalog PD-1, this is primarily an engineering and drive selection manual. The 48 page volume includes an introductory section which explains why and how the positive drives combine the advantages of belt and gear or chain drives while avoiding the disadvantages of metal-to-metal contact, noise, and the need for lubrication. Full construction details are also provided on the grooved pulleys and the thin steel cable belts with cogged undersides that grip the pulleys with gear-drive positiveness. The capacity range of the drive, (fractional up to 600 hp) and the horsepower-to-weight ratio, are also explained. The engineering and selection tables to which the catalog is mainly devoted, cover the five stock pitches in which these drives are available. Detailed selection information is provided in the form of separate drive tables and horsepower ratings for each pitch. *Service Div., Maurey Manufacturing Corp.*

Die Protection 16

Automatic protection against die and press damage caused by **"doubles," misfeed, buckling, thickness** variations and pileups is explained in a new bulletin describing a patented press overload detector. Clearly illustrated are the unique sensing elements and circuitry which, in case an overload occurs, stop the press before the die can strike again. Construction, application and easy installation details are also shown in the brochure. *Wintriss, Inc.*

Grinding Information 17

Bulletin number 560, eight pages, describes vertical machines for precision standard and contour grinding, turning, boring and other machining. Includes four standard series and production or specialized custom machines to meet individual requirements, with swing of up to 178 in. or more. Data is given on tracer or numerical control for these machines, standard features, optional equipment, and custom engineering services. *Frauenthal Div., The Kaydon Engineering Corp.*

Plating Equipment 18

Equipment for plating, blackening, cleaning, pickling, chemical processing, waste disposal, and corrosion control is described and illustrated in a new, eight-page brochure. Numerous illustrations are included depicting plastic exhaust hoods, ductwork, plastic-lined tanks, filters, plating racks, blackening barrels, console platers, acid buggies, etc. The brochure also contains a check list of over 50 items with an accompanying business reply card which can be used to request further information on any item. *Enthone, Inc.*

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By C. J. Kelly
ASSISTANT EDITOR

Heat Treat Review 19

This issue features a discussion of types of equipment used in the continuous line processing of ferrous and non-ferrous strip metal. This article contains illustrations of some of the largest strip processing installations in the country. Other articles cover a new mechanized heat treating installation in the Bombay, India, plant of Premier Automobile Company; also contained is a report on the latest status of precision investment casting by the chief metallurgist of a leading shop which specializes in difficult to machine parts. *Surface Combustion Div., Midland-Ross Corp.*

Pressure Cylinder 20

A new bulletin describes a new high pressure square head cylinder. Numbered Bulletin SH-6-60, it offers general and technical information, and model and mounting dimensions and specifications for this new interchangeable high pressure cylinder. *The Tomkins-Johnson Co.*

Vibration Data 21

A 16 page brochure describing the complete line of products to excite, measure and control vibration is now available. It describes the principles of vibration testing and gives a description and specifications for a complete line of electrodynamic vibration exciters, electrohydraulic shaker systems, electronic power supplies and sine and random motion electronic control consoles. The booklet also includes sections on vibration pickups and vibration meters used in testing engines, missiles, rockets and equipment of any type subject to vibration. A final section covers MB's vibration isolating Isomode pad and engine, machinery and shipping container mounts. *MB Electronics.*

Parallel Shaft Book 22

"Parallel Shaft Speed Reducers" is a new 36 page book (2719) that describes a completely redesigned and expanded line of "balanced design" parallel shaft reducer is in 57 sizes, including 23 new sizes. It describes the complete line and includes full information for selecting the correct drive for every application. Sixteen pages of rating tables contain thermal and mechanical horsepower ratings for each input and output speed. Load classes are shown for almost 250 driven machines. Overhung loads, extended shafts and outboard bearings, dimensions and actual ratios are included in additional tables. *Link-Belt Co.*

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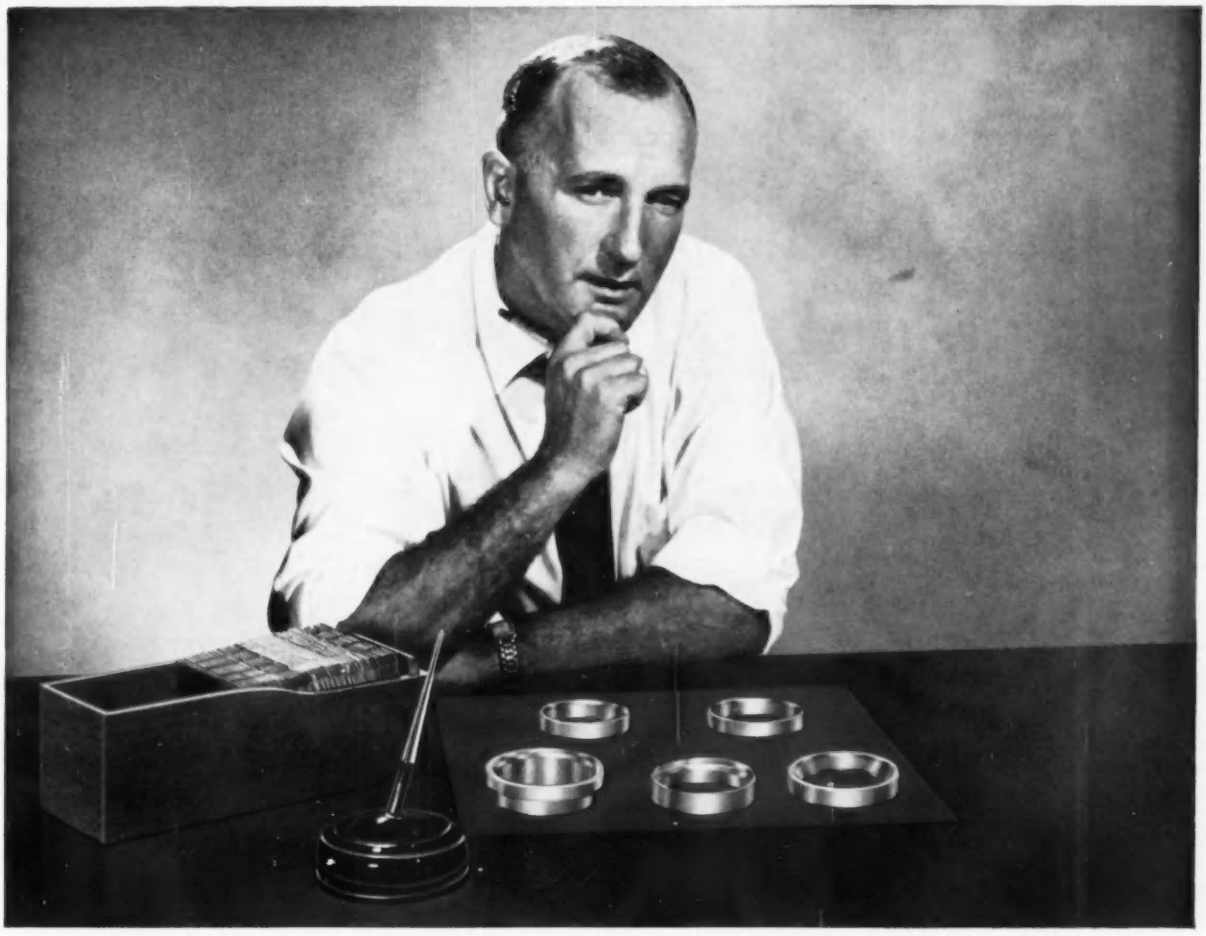

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1. Any kind of insert you may need for any purpose, can be obtained from WAUSAU . . . high nickel content, cobalt-tungsten-chrome, chrome-molybdenum, bi-metal . . . in fact, you name it, we make it. The WAUSAU insert for aluminum engines, for example, helped make such engines successful.

2. WAUSAU inserts are compatible with valve material, correctly matched to expansion characteristics of block or head, stable at high temperatures, highly resistant to impact and corrosion.

3. Inserts are manufactured in WAUSAU's new factory, regarded in the industry as one of America's most advanced plants for the production of precision parts.

4. Maintenance of close tolerances in volume output is assured by specially designed WAUSAU machines and processes, quality controlled at every stage of production.

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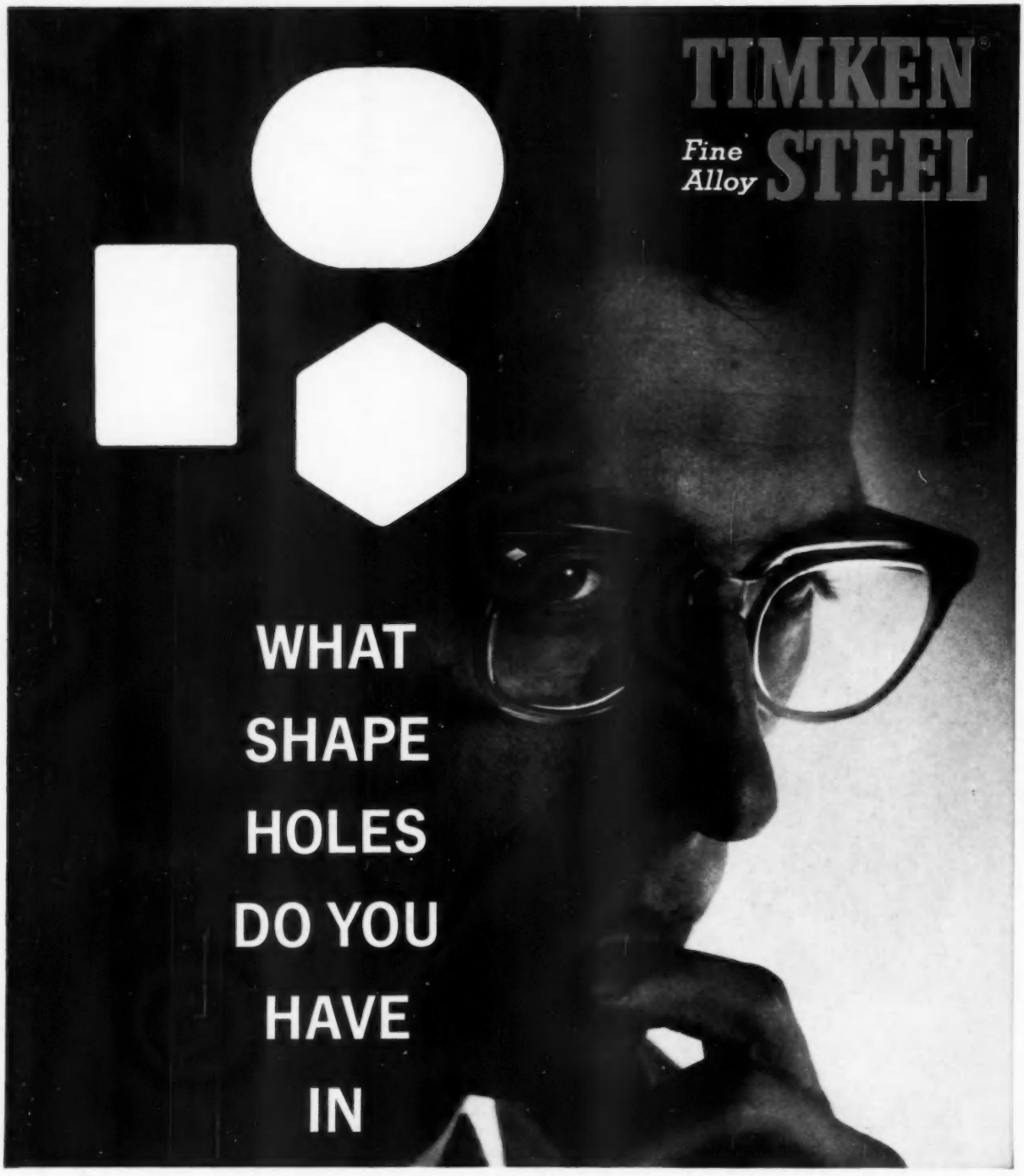

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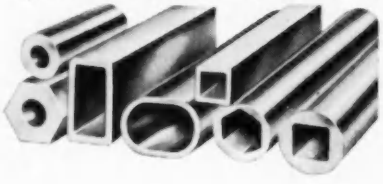

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